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THE CONTENTS

AMATEUR RADIO

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Melbourne, C.1.

EDITORIAL

★

TWENTY-FIVE YEARS OF AGE

On 1st October, 1933—twenty-five years ago—the first issue of "Amateur Radio", published by the Victorian Division of the Wireless Institute of Australia, went to press as the official organ of the Victorian Division of the Wireless Institute of Australia and the Royal Australian Air Force Wireless Reserve. Such was the enthusiasm with which it was received, that within two months it became the official organ of the Wireless Institute of Australia in all States in conjunction with the R.A.A.F. Wireless Reserve.

With the support of advertisers and its hard-working, far-sighted enthusiastic Committee, it continued in publication in octavo format up until the outbreak of World War II., bringing to the Australian Amateur a glossary of information pertinent to the hobby of Amateurs and providing a medium by which Amateurs could express their views and know what was going on in their unique field of communication.

During the years of the War, "Amateur Radio" continued in publication in a roneod form and at the conclusion of hostilities came into print again in its present quarto format.

Between the lines is history! History of the work of an ardent few who have zealously sacrificed their private time in an honorary capacity to maintain its publication. With the advancing years and increasing interest in Amateur transmitting, the magazine has increased its standard until today—its 25th birthday—is seen its finest issue.

Throughout its twenty-five years of publication can be found an historical record of the pursuits of Amateur Radio in Australia; the writings of Amateurs who became known the world over and who are now "silent keys"; men whose activities made milestones in the glorious progress of communication by radio waves; and others who are still active Amateurs and whose names appear in its columns symbolising a never-dying interest in the continuation of the work done by those who went before.

It is not possible to list all those who have done so much to maintain the publication of "Amateur Radio" over the past twenty-five years. To each and every one goes due credit for the work he has done. But one outstanding Amateur known to many who has devoted twenty-five years to its cause is Jim Marsland, VK3NY. From participating in its work from the inaugural issue to editing it and looking after its finances throughout its history, Jim Marsland has unselfishly devoted a virtual life-time and has paved the way for those who will ultimately follow in his footsteps to maintain the only Amateur Radio publication in Australia to a standard undreamed of in its early years.

The Wireless Institute of Australia is proud of its publication. It takes this opportunity of thanking all those people—the Advertisers, the Committee, the correspondents, the technical article writers, the printers, and the Victorian Division of the W.I.A. which has provided the finance to maintain it in publication. "Amateur Radio" today is a well established journal, selling through all leading booksellers and reaching out through members of the W.I.A. to readers all over the world. With new ideas and modern processes the Wireless Institute of Australia looks forward to another twenty-five years of publication for and on behalf of the Amateur Service in Australia.

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THE W.I.C.E.N. COMMUNICATOR

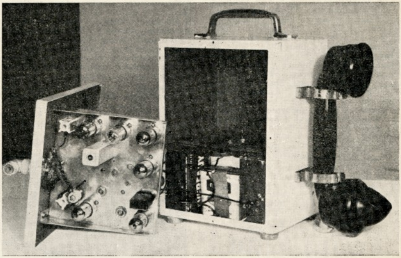
BY BOB GODSALL,* VK2ARG

THE circuit and details of this equipment were arrived at after considerable experiment. While it is not claimed that this is the ultimate in design, tests have proved that this set-up will give a good account of itself. Early experiments using an acorn super-regenerative detector were disappointing, the addition of the r.f. stage making all the difference.

To be useful for the type of service envisaged, the Communicator had to satisfy the following demands:

- Simplicity of operation;
- Reasonable battery life;
- Minimum cost of battery replacement;
- Must use batteries which are easily available in country centres;
- Must be waterproof to the extent that it can be used in heavy rain;
- Robust to withstand hard usage and vibration;
- Use parts which can be procured, keeping disposals parts to a minimum.

* Pacific Road, Palm Beach, N.S.W.



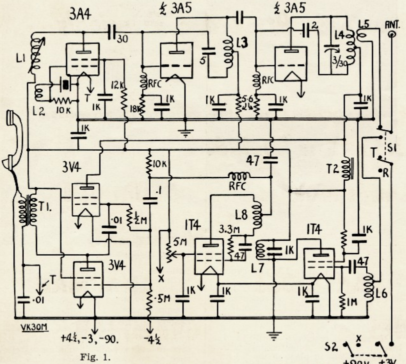


Fig. 1.

L1—5 turns 26 g. enamel, ½ inch diameter.
L2—5 turns 26 g. enamel, wound over cold end of L1. (Note the connection of this coil.)
L3—10 turns 22 g. enamel, centre apped, ½ inch diameter.
L4—10 turns 20 g. spaced wire diameter, ¾ inch diameter.
L5—2 turns wound tightly over centre of L4.
L6—10 turns 26 g. spaced three-wire diameter, tapped 3 turns from cold end, ¾ inch diameter.

L7—5 turns 26 g. enamel, ¼ inch diameter, iron dust slug.

L8—14 turns 26 g. enamel, centre tapped, see text.

Resistors—½ watt as shown.

Miniature potentiometer for the regeneration control should be 0.5 meg., not 5 meg. as shown in circuit above.

RFC—330 microhenry t.v. type.

The frequency of 57.6 Mc. was chosen for the following reasons: This frequency falls in a band which is a permanent Amateur allocation in Australia; it can be reached by the following crystal multiplications: 9.6 Mc. × 6, 7.2 Mc. × 8, and 6.4 Mc. × 9. This frequency is high enough in the band to be free of Amateur interference on the low end where activity normally takes place. Antenna efficiency is high using a small antenna; a quarter-wave stub is only four feet long!

The Communicator gives best results when used as a mobile/portable station working to a base station having higher power, a good antenna, and a sensitive receiver.

Over average hilly terrain, reliable communication can be maintained up to 20 miles; if both stations are well situated, considerably greater distances can be covered. Box to box, 5 to 10 miles can be expected.

With the addition of four feet of co-ax cable, several fittings and a small clamp to fit the window of a car, the Communicator can sit on the car seat and its own antenna fitted outside the vehicle, permitting mobile operation in any car at a moment's notice.

The equipment, complete with the batteries, is housed in a steel box measuring 9" × 6½" × 5½". A P.M.G. type handset clips to the side of the box. Four rubber door stops permit sitting the Communicator on car or table without damage to paintwork.

There are only three controls: On/Off Switch, Send-Receive Switch, and the Regeneration Control. The transmitter is crystal controlled and the receiver fixed-tuned. The chassis and antenna are fitted to the removable panel, a gasket inside providing water-proofing. The six batteries plug into the bottom of the box, and can be changed without a soldering iron. Two Type

482 45v. batteries connected in series provide the h.t.; the filaments run from three number 701 cycle lamp cells connected in parallel. The bias battery is a type 703.

THE CIRCUIT

The transmitter uses a 3A4 pentode in an overtone circuit, giving output at three times the crystal frequency of 9.6 Mc., half a 3A5 double triode doubles to 57.6 Mc., driving the other half as a straight amplifier. This is plate-modulated by a 3V4 pentode using a miniature power choke as the modulation transformer. The receiver has a 1T4 pentode r.f. stage into another 1T4 super-regen. detector. Regeneration is controlled by a pot. in the screen lead. A separate 3V4 audio tube connects to the common input-output transformer.

The change-over from transmit to receive is achieved by switching the antenna and filaments circuits only. Extra switching could combine the function of modulator and audio output, but the price, size, and complication of a multi-contact switch is greater than that of the extra tube, and only one of these tubes is alight at one time.

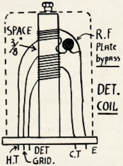
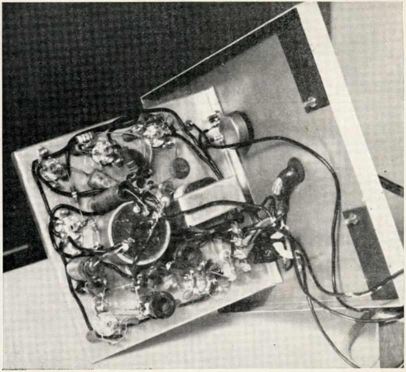


Fig. 2.

The combined transformer T1 can be either a microphone transformer (ex-AT5/AR8) or a midget speaker transformer, the former giving a better match to the handset, but the latter functions quite satisfactorily. The function of the transformer may need some explanation. The microphone and ear-piece are connected in series. One wire from the handset is grounded, the other is connected through the low impedance winding of T2 to the transmitter filament supply, being by-passed to ground with a 0.01 μF. capacitor, which effectively earths this point at audio frequencies. When receiving, the audio tube (3V4) delivers power to the handset; when transmitting the 3V4 modulator grid is excited through the 0.01 μF. coupling condenser. Bias to both tubes is supplied via the half-meg isolating resistors from the small "C" battery.

HINTS

The r.f. plate and the super-regen. coils are wound on a small shielded t.v. type i.f. former, with a slug for each coil. The frequency of L8 can be set with a grid-dipper before placing the can in position, withdrawing the r.f. tube so as not to mistake resonance of L7. The same procedure is used for L7, by removing the detector tube.



Below chassis view of W.I.C.E.N. Communicator.

Both coils should be tuned to about 54 Mc., as placing the can in position **increases** the frequency to around 57.6 Mc. Final tuning can be done on a weak modulated signal.

The 5 pF. feedback capacitor in the doubler circuit of the transmitter is rather critical. If the stage oscillates, this value should be reduced, although if the layout shown is used, no change should be necessary. The same applies to the neutralising condenser shown as 2 pF. The wire is extended from the end of the tank coil down through the chassis, and brought near the grid pin of the final half of the 3A5.

Obtaining drive to the final is the real problem. Two milliamps is necessary for full output. Sometimes removing the by-pass from the r.f. choke in the p.a. grid return will increase drive. Drive can be increased at the expense of h.t. milliamps., by removing the resistor in the lead to L3, and running this stage at 90 volts.

The only snag in the receiver likely to be encountered is poor regeneration control. A moderate hiss should be audible with the pot control about half-way advanced.

Of several receivers built to this layout, one gave better control with a 10 meg. resistor in place of the 3.3 meg. shown. The r.f. tube is prone to oscillation with no antenna connected; this silences the regen. tube, so it is desirable to remove the screen voltage from the r.f. stage while making preliminary adjustments to the detector stage.

Warning.—Remember these are filament tubes—one touch of the 90 volts, and you blow the lot! Turn off the double-pole on/off switch before any soldering changes are made. Also, be careful with a voltmeter probe.

The crystal is an ordinary variety, fitted in an FT243 holder. It was commercially re-ground to the specified frequency. Mention should be made if getting a crystal ground that it is to oscillate at 28.8 Mc. in an overtone circuit.

A 6.4 Mc. crystal can be used, but it is extremely difficult to obtain the full drive to the p.a.

The steel box is obtainable in Sydney from the firm, R. H. Oxford & Son Pty. Ltd., 97 Marriot St., Redfern. It is known as the "W.I.C.E.N. Communicator" box. The handle can be bought at any hardware store.

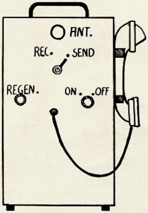
The chassis is constructed from 20 gauge aluminium. The battery clips are constructed from brass strips and secured to the cabinet with ½" brass bolts and nuts. The front panel is secured with four self-tapping screws, with a gasket of cork or other suitable material to give water-proofing.

Two plugs are available from most dealers to fit the two h.t. batteries, which lie on their sides one at each lower side of the cabinet. It is necessary to secure some insulating material such as mica on the inside of the front panel where it bears against the battery plugs. The three cycle batteries stand upright between the h.t. batteries making their earth contact with upright strips of brass. The top positive strips make contact with another brass strip secured under a piece of Masonite which is held down on an ⅛" rod and also secures the batteries from move-

ment. The "C" battery can be soldered in—it will last for years!

It is not intended to give detailed comment on the overtone crystal oscillator as this has been well described in an article by Bob Winch, VK2OA, in "A.R." for Aug. '58. Also there is ample information on this in the Handbook. Perhaps mention should be made here that this type of oscillator will only work on odd overtones, hence a 7 Mc. crystal cannot be used in the Communicator.

Since writing the original information on the Communicator, queries make it desirable to comment on the following: Many experiments were carried out using crystal multiplications of more than six times. While it is possible to obtain over one milliamp. drive, a great deal of fiddling is necessary and the crystal must be very active. It cannot be stressed too strongly that a 9.6 Mc. crystal be used. Any normal crystal (even in the FT243 holder) can be ground to the above frequency. The current charge to get this done is 35/-. Max Howden, VK3BQ, is one of our members who will do the job for you. (Another is Bright Star Radio,—Ed.) At least you don't have any further worries with the heart of the transmitter.



Front Panel Controls of Communicator.

The feedback on the doubler stage does increase the drive to the final a lot and, incidentally, does not help much if this stage triples. It is a help to be able to listen to the crystal and doubler stages during preliminary tests, on 28.8 Mc. or on 57.6 Mc. The doubler may oscillate with no drive, but the crystal holds it to the desired frequency. This is the idea of the regeneration.

In order to be certain that the crystal is controlling the frequency, bring a screwdriver near L1 while listening to the signal on 28.8 or 57.6 Mc. If the crystal has control, no change in frequency will occur.

The transmitter will draw approximately 40 milliamps. when loaded and delivering about 1 watt output. Current to the various stages is: Oscillator 8 Ma., Doubler 10 Ma., Modulator 10 Ma., and Final 12 Ma.

On the receive position, the current is only 12 Ma., which is less than that used by a small broadcast portable.

ANTENNA

The most useful antenna is a centre-loaded 2 foot vertical. This can be made up from $\frac{1}{8}$" brass rod, threaded to screw into a short length of poly. rod, using a loading coil of 14 turns close wound of No. 20 g. on a $\frac{1}{2}$" poly. rod; the exact resonant frequency of the coil can be found with a g.d.o., but remember to remove the antenna from the box and stand it on a piece of metal sheet or grip the plug in a vice, making sure that it is connected electrically to the vice or metal sheet which acts as a ground plane.

A full quarter-wave whip is slightly more efficient and should be about 52 inches long. A cut-down b.c. car antenna can be reduced to one-third this length.

A small collapsible 50-inch whip can be supplied which can be secured by a suitable clip to the box when not in use.

An experimental dipole made from a tank type whip gave excellent results to a base station using a horizontal beam.

Polarisation is important over flat terrain but appears to be less so over rough country, but it is naturally desirable to use either vertical or horizontal at each end. A suitable vertical "J" or ground plane for the base station will be described later, with a base station rig at present under construction.

The Hand-set complete with wire can be purchased from Keep's, Elizabeth Street, Sydney, at a cost of 22/6. Clips to secure same to the box are made from spring steel but cost 8/- a pair.

COILS

The formers for L1, L2 and L3 are those from an SCR522 receiver. There appears to be no available slug-tuned former of this type available. These coils can be wound on $\frac{1}{2}$" poly. rod or pill tubes, L1 and L3 being tuned by Philips type 3-30 pF. trimmers.

The input and output coils (L4 and L6) were wound on small ceramic formers. It is suggested that they be either air-wound or wound on a suitable former such as poly. rod, poly. pill tube containers, or any material having low r.f. loss. The original formers were $\frac{3}{4}$" diameter. L4 has 10 turns of No. 20 gauge, spaced wire diameter. L5 (the link) is two turns of P.V.C. hook-up wire wound tightly over the turns of L4 at the centre, one turn either side of the centre tap.

L6 is also 10 turns but uses 26 gauge spaced three-wire diameters. The antenna tap is three turns from the earthed end. It was found that this coil resonated at the frequency and that no tuning was therefore necessary.

L7 and L8 are wound on a $\frac{1}{4}$" diam. t.v. former tuned with two iron dust slugs, details are shown in Fig. 2.

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An Experimental High Frequency Transistor Portable Superhet. Receiver

Coverage: 12 Mc. to 2.2 Mc. and 1600 Kc. to 550 Kc.

BY S. L. SKINNER,* VK3AFL

THE receiver about to be described is a double conversion superhet with a tuning range from 12 Mc. to 2.2 Mc. plus 1600 Kc. to 550 Kc. in four bands. It uses eleven junction type transistors and one diode.

The first section of the receiver consists of an OC44 mixer and an OC44 local oscillator. The mixer is an earth emitter type amplifier stage.

A signal from the low impedance winding on the aerial tuning coil is fed to the base of the mixer transistor, along with a small amount of r.f. from the local oscillator. The r.f. from the local oscillator is picked up by returning the bottom of the low impedance winding to earth via a few turns around the earth end of the oscillator coil. The OC44 local oscillator has its emitter earth returned, and the base is tapped towards the earth end of the tuning coil in order to match into the low impedance of the base. Generally speaking, the feedback coil winding to the collector requires a few more turns than would normally be used for valve circuitry, but if the base tap to the coil has too many turns, squeeging will take place.

As this receiver was built mainly for high frequency work, the problem of second image was overcome by using a 2 Mc. first i.f. At this frequency, the stage gain of the second mixer is not greatly effected. Further more, with the local oscillator on 2.150 Mc., the harmonics do not fall into the tuning range of the Amateur bands.

The second stage. As already stated the input to the second mixer is at 2 Mc. Both the mixer and local oscillator use 2N112 transistors. Operation of the second converter is the same as for the first converter, the output frequency from the second mixer being 150 Kc.

The third stage. This stage is the main intermediate frequency stage at a frequency of 150 Kc. Various types of transistor intermediate amplifiers were tried, until it was decided to again use the grounded emitter type of circuitry, and feed the low impedance winding into the base of the transistor.

The frequency of 150 Kc. was selected in an attempt to obtain a reasonable amount of selectivity. By using a low gain transistor, either an OC71 or OC73, in the first position followed by a high gain transistor, either an OC44 or 2N112, it provided plenty of gain and remained stable without neutralisation.

Diode detection was selected for simplicity, but gain and a.v.c. action could be improved by using an OC71 transistor as a detector.

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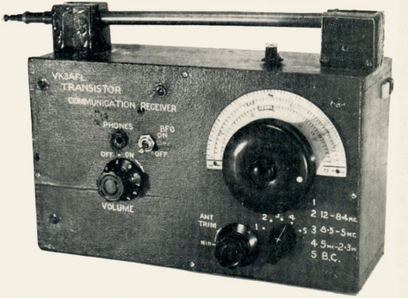
The beat frequency oscillator circuit is very simple and was copied from Philips' Transistor Manual. No attempt was made to couple the b.f.o. to any stage of the i.f., stray coupling being sufficient.

The fourth stage. This is the audio stage and was also copied from the Philips' manual, but with the following modification. In place of an OC71 transistor a high gain transistor 2N138 was used to compensate for the loss due to the use of the OA70 diode detector.

acitors and resistors identical with those used in the local oscillator of the receiver being built.

(f) Multimeter.

The test oscillator was constructed first, and was used to check the h.f. transistors to be used in the receiver and for checking the frequency coverage of the oscillator coils to determine the capacity values to be used in the padding capacitors.



TESTING

For testing during construction of the receiver, the following equipment was used:

(a) Receiver CR300, tuning range 15 Kc. to 25 Mc. Used to check the frequency of the oscillator.

(b) Signal Generator covering 150 Kc. to 30 Mc.

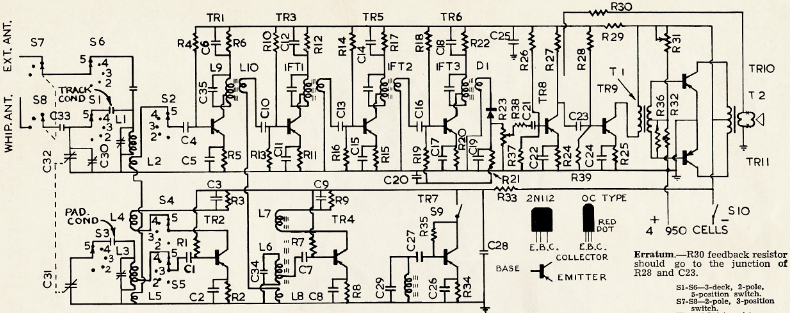
(c) Grid Dip Oscillator, for checking frequency of coil windings.

(d) A second h.f. receiver with a calibrated S meter, used mainly to compare the output of various transistors used in the oscillator test set.

(e) Oscillator Test Unit, constructed breadboard style. This unit was constructed with values of cap-

On completion of the test set a coil was wound with 8 turns 18 g. primary, 4½ turns 24 g. feed-back winding close wound to the primary, base tap 2 turns at earth end of coil. The tuning capacitor was rotated miminum to maximum and with the aid of the g.d.o., frequency coverage determined as 15 Mc. to 6.5 Mc. An OC44 transistor was inserted in the socket and the battery supply (—6v.) connected.

This transistor oscillated from 6.5 Mc. to 7.2 Mc. Alteration to the feedback winding and base tap made no difference, it would not oscillate any higher in frequency. The current drawn was approximately 300 microamps. A second OC44 was tried. This one oscillated freely from 6.5 Mc. to 11.8 Mc., then from 11.8 Mc. to 12.5 Mc. the note of oscillation became very rough, and beyond 12.5 Mc. would not oscillate.



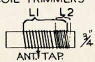
Erratum.—R30 feedback resistor should go to the junction of R28 and C23.

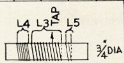
S1-S6—3-deck, 2-pole, 5-position switch.
S7-S8—2-pole, 3-position switch.
TR1—OC44 transistor.
TR2—OC44 transistor.
TR3—2N112 transistor.
TR4—2N112 transistor.
TR5—OC73 transistor.
TR6—2N112 transistor.
TR7—OC71 or TS3 transistor.
TR8—2N138 transistor.
TR9—OC71 transistor.
TR10—OC72 } Matched
TR11—OC72 } pair transistors.
D1—OA70 diode.

C1—0.001 μF. silver mica.
C2—0.001 μF. silver mica.
C3—0.01 μF. mica.
C4—0.01 μF. silver mica.
C5—0.01 μF. mica.
C6—0.01 μF. mica.
C7—0.001 μF. silver mica.
C8—0.001 μF. silver mica.
C9—0.01 μF. mica.
C10—0.01 μF. silver mica.
C11—0.01 μF. mica.
C12—0.01 μF. mica.
C13—0.01 μF. disc ceramic.
C14—0.04 μF. tubular.
C15—0.04 μF. tubular.
C16—0.01 μF. disc ceramic.
C17—0.04 μF. tubular.
C18—0.04 μF. tubular.
C19—0.05 μF. tubular.
C20—6 μF. low voltage.
C21—10 μF. low voltage.
C22—32 μF. low voltage.
C23—32 μF. low voltage.
C24—100 μF. low voltage.
C25—100 μF. low voltage.
C26—390 pF. silver mica.
C27—0.1 μF. tubular.
C28—100 μF.
C29—820 pF. silver mica.
C30—25 pF. midget variable.
C31, C32—10-415 pF. 2-gang midget variable cond.
C33—500 pF. mica.
C34—120 pF. silver mica.
C35—200 pF. silver mica.
R1—1 megohm, ½w.
R2—1K, ½w.
R3—2K, ½w.
R4—470K, ½w.
R5—1K, ½w.
R6—2K, ½w.
R7—1 megohm, ½w.
R8—1K, ½w.
R9—2K, ½w.
R10—470K, ½w.
R11—1K, ½w.
R12—2K, ½w.
R13—100K, ½w.
R14—82K, ½w.
R15—330 ohms, ½w.
R16—10K, ½w.
R17—2K, ½w.
R18—82K, ½w.
R19—10K, ½w.
R20—470 ohms, ½w.
R21—2.7K, ½w.
R22—2K, ½w.
R23—50K pot. with switch.
R24—1.8K, ½w.
R25—470 ohms, ½w.
R26—82K, ½w.
R27—5.6K, ½w.
R28—39K, ½w.
R29—100 ohms, 2w.
R30—100K, ½w.
R31—5K pot.
R32—Thermistor (Philips).
R33—100 ohms, 2w.
R34—3.9K, ½w.
R35—220K, ½w.
R36—82 ohms, ½w.
R37—15K, ½w.
R38—8K, ½w.
R39—18K, ½w.
T1—Rola DR2. Primary 3K, Secondary 1330 ohms.
T2—Rola TR7. Primary 420 ohms, Secondary 3.5 ohms.
Speaker—Rola C3, 3 inch.

1ST CONVERTER-MIXER COILS						1ST CONVERTER OSC. COILS					
SWITCH POSITION	COVERAGE	L1	L2	TRACK COND.	ANT CAP	COVERAGE	L3	L4	L5	TAP	PAD. COND
5	1600-550KC	SEE TEXT	4 T 28 GW	NIL	10 PF	3·6-2·55	38 T 26 GW	12 T 26 GW	2 T 28 GW	10 T	150
4	5·-2·2MC	36T 22GW	4 T 26 GW	NIL	200	7·-4·1	30 T 22 GW	10 T 26 GW	3 T 26 GW	10 T	220
3	8·4-5·MC	26T 22GW	3 T 22GW	150	75	6·4-3·	32 T 22 GW	10 T 22 GW	2½ T 22 GW	10 T	580
2	12·-8·5MC	8 T 16G.	2 T 22 G	470	50	10·-6·5	10 T 16 GW	4½ T 22 GW	1½ T 22 GW	2 T	680

ALL COIL TRIMMERS 3 - 30 PF





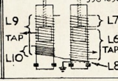
2ND CONVERTER
2ND MIXER COIL

L9	L10	TAP
50 T 28G. EW	5 T 28G EW	25 T

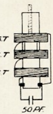
2ND OSC 2·150 KCS.

L6	L7	L8	TAP
50 T 28G. EW	20 T 28 GW	2 T 28GW	16 T

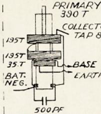
COIL FORMERS TYPE 358-1696



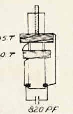
ORIGINAL COIL
TYPE N° 358-1696
FREQ 400 KCS.



AMENDED COIL
FOR 150 KCS I.F.
BASE WINDING
IF T1 & IF T2 35 T
IF T3 60 T
PRIMARY
390 T



AMENDED COIL
FOR B.F.O. 150 KCS.



H.F. TRANSISTOR RECEIVER
DRAWN BY S.L. SKINNER

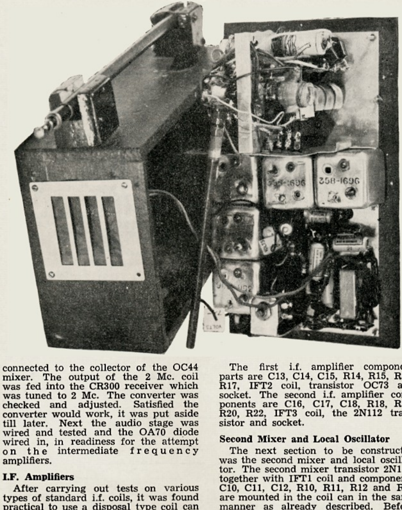
The current drawn was 150 microamps. A third OC44 was tried, this one stopped oscillating at 9.7 Mc. The current drawn was 230 microamps.

The second OC44 had the greatest output, so it was used as the local oscillator, the third OC44 being used as the mixer. From the tests made it will be noted that it is necessary to select transistors to be used in h.f. applications. Do not expect transistors of the same type number to have the same performance.

CONSTRUCTION

The first section of the receiver to be constructed was the first converter. The layout and size of the complete receiver was worked out at this time.

The tuning capacitor and switch were mounted on the sub-chassis and the slow motion dial fitted. The OC44 mixer and OC44 local oscillator were wired up, coils for the switch position No. 2 were wound, checked, mounted in position and wired to the switch. A temporary 2 Mc. coil was wound and



connected to the collector of the OC44 mixer. The output of the 2 Mc. coil was fed into the CR300 receiver which was tuned to 2 Mc. The converter was checked and adjusted. Satisfied the converter would work, it was put aside till later. Next the audio stage was wired and tested and the OA70 diode wired in, in readiness for the attempt on the intermediate frequency amplifiers.

I.F. Amplifiers

After carrying out tests on various types of standard i.f. coils, it was found practical to use a disposal type coil can No. 358-1696 out of the BC966A I.F.F. equipment. The decision was made to build each i.f. amplifier in these coil cans and modify the coils to suit. There are two coils in each can. One coil is removed and the second modified as follows:

Two pies of the coil are used with a 500 pF. capacitor, which with the aid of the tuning slug, will tune to 150 Kc. From the top pie, 80 turns were unwound, about an inch of the wire twisted together and tinned, then the 80 turns scramble wound back on top of the pie. The tap at 80 turns is the connection for the collector. The third pie, which was cut away, now becomes the secondary or base coil. For IFT1 and IFT2 unwind approximately 60 turns, leaving not under 35 and not over 40 turns. For the secondary of IFT3 leave approximately 60 turns. The wax is then heated and the base winding pushed up close to the primary winding.

The component parts associated with each stage are mounted on tag strips screwed to the base plate inside the coil can.

The first i.f. amplifier component parts are C13, C14, C15, R14, R15, R16, R17, IFT2 coil, transistor OC73 and socket. The second i.f. amplifier components are C16, C17, C18, R18, R19, R20, R22, IFT3 coil, the 2N112 transistor and socket.

Second Mixer and Local Oscillator

The next section to be constructed was the second mixer and local oscillator. The second mixer transistor 2N112, together with IFT1 coil and components C10, C11, C12, R10, R11, R12 and R13 are mounted in the coil can in the same manner as already described. Before attempting the local oscillator, the 150 Kc. amplifier strip was aligned with the aid of the signal generator using the multimeter to measure the output of the audio amplifier. The alignment of the i.f. coils was made by adjusting the iron slugs.

The second mixer coil, along with the second oscillator coil were mounted alongside each other in another coil can. (For details of coils, see drawing.) Inside the same can, the 2N112 oscillator transistor and component parts C6, C7, C8, C9, C34, C35, R6, R7, R8 and R9 were mounted. When wired, the stage was coupled up ready for alignment. Firstly, the local oscillator was checked for correct frequency of 2.150 Mc., using the CR300 receiver as a wave meter. Frequency adjustment was made by adjusting the slug in the oscillator coil. The signal generator was then set at 2 Mc. and the second mixer coil adjusted. The receiver was at this stage a single conversion superhet. Had the coils been altered, good performance would have been available on the b.c. band.

Beat Frequency Oscillator

The b.f.o. was next wired and all components fitted into a coil can. The b.f.o. frequency was located on the CR300 receiver and adjusted with the iron slug.

First Mixer and Oscillator

The next step was to couple the first mixer output to the 2 Mc. coil.

The test set, using the OC44 oscillator transistor from the receiver, was now used to check the frequency of the local oscillator coils. For example, the b.c. band frequency coverage of 1600 Kc. to 550 Kc. plus i.f. frequency of 2 Mc. = local oscillator frequency, 3.6 Mc. to 2.55 Mc.

The oscillator coil was wound and wired into the test set and frequency checked. The coverage was from 1.5 Mc. to 3.6 Mc., so a 150 pF. padding capacitor was wired between the tuning capacitor and coil to slow the oscillator frequency to the desired coverage of 3.6 Mc. to 2.55 Mc. All the oscillator coils were wound and the padding capacitors selected by the same means. The link coil was made adjustable in order to vary the amount of r.f. injection to the mixer.

The oscillator coils were then mounted and wired to their switch positions, the OC44 oscillator transistor replaced in the receiver, and each coil again checked for correct frequency coverage.

The mixer coils were the next problem. The test set was again used in conjunction with the g.d.o. to adjust these coils. The b.c. band coil is a Q Plus loop stick with 4 turns of 28 g. enamelled wire wound over the earth end of the loop stick winding for base input to the mixer. No tracking capacitor was required. The next band, 5 Mc. to 2.2 Mc. (switch position 4), as can be seen from the coil table, consists of 36 turns of 22 g. wire on a ¾" diameter former, with 4 turns of 26 g. wire for the base winding. The base winding is interwound at the cold end of the primary. No tracking capacity was required, any adjustment required being made with the trimmer. The antenna is tapped half way down the primary coil through a 200 pF. capacitor.

The following band, 8.5 Mc. to 5 Mc. (switch position 3), was then wound

(Continued on Page 42)

25 Years of AMATEUR RADIO

WITH the publication of this issue AMATEUR RADIO celebrates the 25th Anniversary of its publication as the official journal of the Wireless Institute of Australia.

In attempting to produce what might be termed a history of the magazine it has been found that many of the early records have been mislaid and consequently it has not been possible to adequately cover the stage dealing with the initial work which led up to the publication of the first issue of AMATEUR RADIO on 1st October, 1933.

Although the Victorian Division of the Wireless Institute of Australia had been founded in 1910, it was not until 1925 that the Division was incorporated. Radio, as we know it today, was still in its infancy and it was not until broadcasting commenced that any commercial magazines were produced. These were designed primarily to cater for the broadcast listener with most of the technical articles being written for the broadcast receiver builder and with large sections devoted to the programs of all stations.

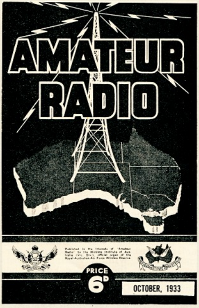
Most of these journals, some of which were on the market for a short time only, did devote some space to news of Amateur activity, but it would have been unreasonable to expect that technical articles for the transmitting Amateur should be printed. It must be remembered that, in those days, the Amateur represented an extremely small percentage of the total population of Australia, and less than 700 Amateur Operator's Certificates of Proficiency had been issued up until the end of 1930.

Such news of happenings of interest to the Amateur were contributed by Amateurs acting on behalf of the various Divisions of the W.I.A. or Radio Clubs and, in some cases, by Amateurs acting in a private capacity. It had long been realised by the different Divisions of the W.I.A. that, whilst this system of a few pages in a commercial magazine was undoubtedly of value to members, it was far from ideal and in so far as the Victorian Division was concerned, it had been agreed that only by producing a magazine of our own which would be devoted entirely to Amateur interests, would it be possible to attempt to cover the interests of all members, and in particular those members who lived in country areas and were therefore unable to attend meetings and lectures.

It would appear to have been about the middle of 1933 that a sub-committee was formed by the Council of the Victorian Division to investigate the possibility of publishing an Institute magazine. This committee consisted of Harry Kinnear (VK3KN), Bill Gronow (VK3WG), Vaughan Marshall (VK3UK) and Bill Sones. No record is available of the deliberations of this committee, but their enthusiasm convinced the Council that a magazine could be produced and that the Radio Trade would contribute by way of advertisements.

ERRATA: Should read: "Continued on Page 46."

The first issue of AMATEUR RADIO appeared on 1st October, 1933. This issue ran to 20 pages and cover with a page size of 8½ inches by 5½ inches, just half the size of the present page. Three pages and portion of the covers were devoted to paid advertisements. The only technical article, "Simple Crystal Control," by Max Howden (VK3BQ), occupied two pages and the remainder cf the journal was taken up with notes from the different sections of the Victorian Division, from affiliated clubs and from the R.A.A.F. Wireless Reserve.



Reproduction of the Cover of the First Issue of AMATEUR RADIO

Rules for the 1933 Australian Five-Point Relay Contest were included, together with results of the 1933 A.R.R.L. Contest, the first two places in Australia being filled by R. H. Cunningham (VK3ML) and R. E. Jones (VK3RJ).

This first issue of AMATEUR RADIO was solely a Victorian one, but the November issue saw the inclusion of notes from New South Wales, Queensland, South Australia and Western Australia. To quote from the N.S.W. notes, "We are solidly behind this attempt to firmly establish a really 100 per cent. Amateur journal for the Commonwealth." This statement reflected the true Amateur spirit, as it later transpired that the Association of Radio Amateurs (N.S.W.) had also been investigating the possibilities of publishing an Amateur journal and abandoned their proposal when it was found that Victoria had already produced a magazine.

During November 1933, Bill Sones retired from the committee and Jim Marsland (VK3NY) became Secretary with Harry Kinnear (VK3KN) as Editor, and Bill Gronow (VK3WG) and Vaughan Marshall (VK3UK) as Sub-Editors. The latter two with Jim VK3NY formed the nucleus of the committee for over seven years and Jim VK3NY is still a member of the committee. In March 1934 Bob Cunningham (VK3ML) became Technical Editor and Len Moncur (VK3LN) took over the distribution of the magazine.

For the first year of publication the advertising salesmen were the Editor, Harry Kinnear (VK3KN) and Sub-Editor Bill Gronow (VK3WG), and some amusing stories are told of their efforts to sell space in the journal. It is reliably reported that, on one occasion, when a particularly hard-hearted member of the trade offered to pay 10/- for a full page instead of the £4 being asked, VK3KN somewhat tersely replied that the day would come when the same man would be glad to pay £10 a page. That rate has been reached but the prospective advertiser is no longer catering for Amateurs. However, our Amateur salesmen must have convinced the members of the trade generally that it was good business to advertise in AMATEUR RADIO as they continued to support the magazine with their advertisements and many of those early advertisers are still solidly behind AMATEUR RADIO as an advertising medium.

After twelve months the printing of the magazine was transferred from Messrs. Wilke & Co. to the Elsum Printing Company and Mr. Elsum, Snr., became the Advertising Representative. In June 1936, both Harry Kinnear (VK3KN) and Len Moncur (VK3LN) retired from the committee and Cedric Serle (VK3RX, now VK3ARX) and the late Ernie Kilborn (VK3KE) were co-opted. Bill Gronow (VK3WG) became Editor at this stage and continued to act in this capacity until January 1941. Ern Kilborn (VK3KE) died suddenly in June 1937 and the existing committee carried on until February 1938 when Thorburn Powers (VK3PS, now VK-3APS) joined the committee and in July 1939 Herb Stevens (VK3JO) took over the distribution of the magazine.

With the outbreak of war in September 1939 both Vaughan Marshall (VK3UK) and Bob Cunningham (VK-3ML) were called up for service with the Royal Australian Air Force. Vaughan and Bob had both played a leading part in the formation of the R.A.A.F. Wireless Reserve and at the outbreak of war, Bob VK3ML held the rank of Flying Officer and was Federal Commander of the Reserve. Vaughan VK3UK, with the rank of Pilot Officer,

was Divisional Commander for Victoria. Bill Gronow (VK3WG) also enlisted in the R.A.A.F. in July 1940. All three served with distinction. Vaughan Marshall (VK3UK) rose to the rank of Group Captain and became Director of Telecommunications for the R.A.A.F. Bob Cunningham (VK3ML) held the rank of Wing Commander and served as Chief Signals Officer in various areas in both Australia and the Pacific. Bill Gronow (VK3WG) also became a Wing Commander and officer in charge of Technical Development of Signals and Radar Equipment, and its production in Australia.

All three continued to act on the Editorial Committee until, with the publication of January 1941 issue, the Victorian Division was no longer in a position to continue to print the magazine. However, AMATEUR RADIO was not destined to disappear "for the duration" as so many other Amateur publications were forced to do. It was realised that, with so many members of the W.I.A. serving with all branches of the Defence Forces and scattered all over the world, something would have to be done to keep them in touch with one another, and it was decided that a duplicated version of AMATEUR RADIO should be produced.

After missing only one month, the committee was reorganised with Tom Hogan (VK3HX) as Editor, and Jim Marsland (VK3NY), Herb Stevens (VK3JO), Charlie Quin (VK3WQ, now VK2AWQ), Alec Clyne (VK3VX), Ken Ridgway (now VK3CR) and the late Bert Burdekin as members of the committee. A hand-operated rotary duplicator was purchased and from March 1941 until September 1945 the wartime version of the magazine appeared each month. The amount of work that went into this production was colossal as the magazine grew from 10 pages to 16 pages quarto size and over 600 copies were being produced for most of the time. When it is realised that every page represented one turn of the duplicator and that allowance had also to be made for "spoils", some idea of the magnitude of the task can be obtained. The duplicator was most temperamental, quality of paper available left much to be desired, and while two men operated the duplicator the others were busy checking and counting the printed pages. The pages had then to be collated, inserted in the cover which had been printed and then stapled together, also with a hand-operated machine. Finally, copies had to be wrapped, addressed and posted.

For the whole of this period, every member of the committee gave up two full Saturday afternoons every month to cope with the printing alone as well as hours of spare time in keeping the routine work up to date.

Although technical articles were included in the war-time issues, the main purpose, of course, was to keep members in touch with one another and, as no transmitting was permitted, any notes published were in the main personal items. With increasing numbers serving with the Defence Forces, one of the main features was "Slouch Hats and Forage Caps." This section was conducted by Jim Corbin (VK2YC) from November 1941 until September 1945 and involved a considerable amount of work, mainly by correspondence.

Throughout the whole of the four and a half years of production of the duplicated magazine, the "printing office" was located at the home of Jim Marsland (VK3NY) and the committee were indebted to Mrs. Marsland for her cooperation. She not only assisted with the sorting and collating of pages, but supplied innumerable cups of tea, biscuits and cakes throughout the whole period.

With the cessation of hostilities in August 1945, it was immediately decided that printing of AMATEUR RADIO should re-commence. The services of Mr. W. J. Lewis were obtained as Advertising Representative and arrangements were made for Messrs. H. Hearne & Co. to print the magazine and in October 1945 publication was resumed in the present form. It was immediately apparent that the goodwill which had been fostered, firstly by Harry Kinnear (VK3KN) and Bill Gronow (VK3WG), and built up by our Advertising Representatives during the pre-war period was still existent and our advertisers again came to our assistance with their support.

Tom Hogan (VK3HX) continued to act as Editor, Ken Ridgway (VK3CR) became Technical Editor, Herb Stevens (VK3JO) Distribution Officer, and Jim Marsland (VK3NY) continued as Business Manager. In March 1947 Ron Higginbotham (VK3RN) joined the committee as Notes Editor and in March 1948 Jack Duncan (VK3VZ) became Technical Editor when Ken Ridgway (VK3CR) resigned through pressure of private business. Alan Head (VK3AKZ) joined the committee as Assistant Technical Editor in July 1947 and Jim Irvine (VK3TU) took over the distribution from Herb Stevens (VK3JO) in September 1948. During the past ten years circulation has been in the hands of Stan Zeunert (VK3SZ), Ian Sewell (VK3IK) and Bill Tregear (VK3TX).

After serving as Editor for over fifteen years, Tom Hogan (VK3HX) resigned in May 1956 and Jim Marsland (VK3NY) took over as Editor with Ron Higginbotham (VK3RN) as Associate Editor, Ken Pincott (VK3AFJ), who had been recruited to the committee in February 1954, became Technical Editor in August 1955 when Jack Duncan (VK3VZ) vacated the position, although he continued to assist on the committee.

During the post-war years the Technical Editors have been assisted by Jock Fisher (VK3AFF), Doug. Norman (VK-3UC), Ron Fisher (VK3OM) and Alec Morrison (VK4MA), all of whom have contributed many hours of work in the preparation of circuit diagrams.

With the expansion of AMATEUR RADIO it was necessary to completely re-organise the Editorial staff in May of this year and Ron Higginbotham (VK3RN) became Editor with Ken Pincott (VK3AFJ) continuing as Technical Editor. The committee has been considerably enlarged and now consists of George Baty (VK3AOM), George Bills-Thompson (VK3AHN), Sid Clark (VK3ASC), Jack Duncan (VK3VZ), Ron Fisher (VK3OM), Vern Jones (VK3YE) and Jim Marsland (VK3NY).

Since June 1949 the printing of AMATEUR RADIO has been in the hands of the "Richmond Chronicle" and the co-operation of Mr. Roberts and his staff cannot be spoken of too highly. Our Advertising Representative, Miss Beatrice Touzeau, has also done a sterling job and our relations with the trade have never been better.

Notwithstanding the work which has been put in to the production of AMATEUR RADIO over the past 25 years by members of the Editorial Committee, we must not lose sight of the fact that a magazine cannot be produced without an army of contributors. Many hundreds of technical articles have been written for the magazine and it would be impracticable to name the writers, all of whom have contributed in an honorary capacity. To them, and also to the writers of regular features such as DX Notes, V.h.f. Notes, Federal and Divisional News, the Editors are indebted for their support and cooperation at all times.

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THE TA2 SPECIAL

BY CDR. C. M. STURKEY, JR., U.S.N., W7TNA

THE reason for the title will remain obscure for the present. Primarily, it is a device to encourage you to read further. My interest in preparing this little article resulted from a recent round table with VK3JK and W7IAA. These two were using s.s.b.s.c. and I was using d.s.b.s.c. (double sideband suppressed carrier). After giving a brief run down on my "home brew" d.s.b. rig, pointing out its simplicity, both from the standpoint of construction and adjustment, and taking several deep bows as a result of the compliments passed on the sharpness and quality of my signal, the subject of the conversation got around to a discussion of the difficulties confronting the average Ham who wishes to get started in s.s.b.

Because of the ample availability of excellent "store bought" Amateur s.s.b. transmitters in this country, well-heeled U.S. Hams have no problem. However, it might come somewhat as a shock to some VKs who have heard the many KWS-1's, KWM-1's, HT-32's, etc., on the bands, that the average U.S. Ham cannot afford this kind of equipment. The dwindling group of "home brew" artists also have their problems with s.s.b. Assuming that they have a better grasp of technical know-how than the average, the cost of acquiring the necessary test equipment is often prohibitive. For the VK Ham and most outside of the U.S., the problem of getting started in s.s.b. is a much more serious one. Do not misunderstand me—I am not running down s.s.b. or discouraging you from giving it a try, but only pointing out why there are not more on the bands, particularly outside the U.S. and Canada, who are taking advantage of this wonderful medium of communication.

All you physiologically maladjusted Hams who are obsessed with a suppressed desire to talk back to the "Donald Ducks" should not be discouraged. The "TA2 Special" is the solution to your problem. Not only can you work the s.s.b. boys without a word of apology for your signal, with this transmitter it will not even be necessary for you to sever social intercourse with your old friends on the c.w. and a.m.

If I have not lost your interest by now, it should be safe for me to clue you on the name chosen for this rig. It all started in Turkey in 1952 during my tour of duty as U.S. Naval Advisor at a Turkish shipyard near Izmit. A few VKs may still have my QSL card (TA2EFA) around the shack. Since the first prototype of this transmitter was built and operated in Turkey, it has been dubbed the "TA2 Special". Using this rig, I had the doubtful honor of turning in the top Turkish score in the DX contest. It would only be honest to tell you that I was the only TA entered that year.

If there is anything original about the "TA2 Special" it is that it combines the features of d.s.b.s.c. transmission which has recently received much attention by our U.S. publication "CQ Magazine"[1] and d.s.b.r.c. (double sideband reduced carrier) which was covered in "QST"[2] by a two-part classic by George Grammer in 1951. Fig. 1 is a simplified circuit of a proposed medium-powered version of the "TA2 Special". Most will notice immediately that basically it consists of a balanced modulator plus a grounded grid linear amplifier. While the grounded grid linear provides a very efficient and foolproof way of increasing power output, it is not a "must" as a balanced modulator can go directly to the antenna. By using heavy duty pentodes or tetrodes with proper characteristics (ones requiring relatively low screen grid voltage would be preferable), it is possible to get a high-level output without the linear amplifier.

used. From this it may be seen that the amount of carrier developed depends on the screen grid voltage applied, always keeping an opposite and approximately equal voltage on the other screen grid.

Up to the point of 100% modulation this stage performs like a conventional single-ended screen grid modulated transmitter. When 100% modulation is exceeded, the tube with a negative d.c. voltage on the screen grid starts to work. Assuming theoretically perfect tubes, if we use 50 volts positive on the screen grid of V1, 50 volts of audio would give 100% modulation. Even though we also are applying this audio to the screen grid of V2, nothing happens because on the positive swing the 50 volts of audio subtracts from the minus 50 volts of fixed d.c. giving us zero voltage. Now, consider what happens when we increase our audio—say 100 volts of audio is being used. On the positive swing, the V1 has +150 volts and V2 has —150 volts. When the audio voltage reaches the peak at the opposite swing of the cycle, V1 will have —50 volts and V2 +50 volts. At the point when V1 stops working, V2 picks up the load. Fig. 2a shows 100% modulation using the 50 volts of audio as per example above. Fig. 2b shows the over-modulation that would result with a single-ended stage under the same conditions with 100 volts of audio. Fig. 2c shows the results of 100 volts of audio with two tubes operating in a "balanced modulator".

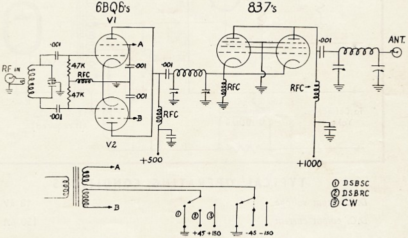

Fig. 1.—Simplified circuit of "TA2 Special".

Looking at Fig. 1 again, it will be noticed that the modulation transformer has a split secondary. This makes it possible to apply separate screen grid voltages to the two tubes. In position 1, both screen grids are at d.c. ground potential. With approximately balanced components and tubes a carrier suppression of about 40 db. will result. When audio is applied to the screen grids, d.s.b.s.c. is produced. In position 2, a positive voltage is applied to one screen grid and an equal negative voltage is applied to the other, this gives d.s.b.r.c.

I will not go into too much detail on d.s.b.r.c. here because those interested should check their back files of "QST" or visit the library to read George Grammer's articles in "QST". However, here is a somewhat oversimplified explanation. In the absence of audio, the tube with the negative screen grid voltage is effectively removed from the circuit except for the fact that it continues to act as an excellent neutralising condenser for this stage. The tube with the positive screen grid voltage operates as a class C amplifier at reduced efficiency. This is because of the relatively low screen grid voltage being

While we are on the subject of oscilloscope patterns, we might take a look at the presentation resulting from d.s.b.s.c. signals. It is interesting to note that with single sideband transmission it is necessary to use two tones to get this presentation, but only a single audio tone is necessary to make this check with d.s.b.s.c. Fig. 2d shows what you will see with good carrier

(Continued on Page 16)

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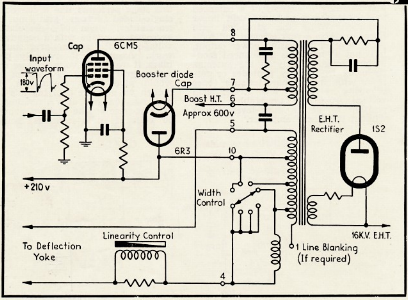
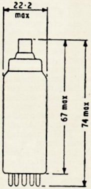




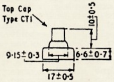
TYPICAL OPERATING CONDITIONS

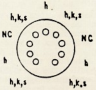
D.C. output voltage	18 *kV*
D.C. output current	150 *μA*

MAXIMUM RATINGS

P.I.V.	22 *kV*
D.C. output current	0.8 *mA*

The 1S2 is a half-wave rectifier designed for use in television EHT supply units deriving their input from the line time-base fly-back pulse. The peak inverse rating of 22 kV enables an EHT of 18 kV to be obtained with an adequate safety margin. The heater requirements of 1.4V at 0.53A may be supplied by a winding on one limb of the line output transformer. Additional data is available to design engineers on request.





B9A
Noval Base

All dimensions in mm

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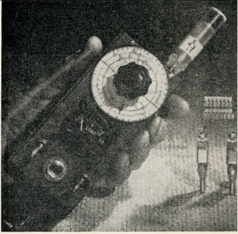
THE IMPROVED DIPPER*

Here is a new model streamlined so the instrument can be manipulated in one hand

WILFRED M. SCHERER, W2AEF



The Improved Dipper, having a range of 1.7 to 275 Mc. The toggle at the lower left is the filament switch, the one at the right is the plate switch. The Jones power receptacle is at lower centre bottom.

THE IMPROVED DIPPER includes several refinements over the original instrument described by the author.[1] It is a more compact design, greatly facilitating handling and operation.

The new model is a.c. operated and entirely self-contained in one small case. The grid meter is located directly in the same line with the tuning dial and the probe coil, so it may be easily observed.

The line cord is connected by means of a plug for easy removal for substitution of a separate cable when battery operation is desired. [Here in Australia, we will have to use a separate power supply.—Ed.] Self-contained battery operation was at first planned, but was abandoned because available tubes having small filament drain were not found rugged enough for general portable operation. The use of batteries, in most cases, is not required except under some conditions of antenna measurements where it may be more convenient. And batteries too often have a habit of running down at just the psychological moment.

The tuning dial is arranged so that the instrument may be held and tuned at the same time by one hand. The frequency range, 1.7 to 275 Mc., is covered using seven coils, each having a tuning ratio of 2.5 to 1. The Amateur bands are located at the low frequency end of each scale where there is slightly greater spread (the variable capacitor is one of straight line wavelength). Considerable overlap between ranges is also included so the second harmonic of each band may be read directly on its same scale. All the scales up to that covering 65 Mc. may be checked directly with WWV.

The entire range of the instrument could be covered using only six coils, but with a sacrifice of overlap and spread on each Amateur band. The range may be extended up to 350 Mc. or below 1.7 Mc. with additional coils for which an eighth dial scale, reading from 0 to 10, is provided for reference calibration. Each coil is protected by an insulated sleeve.

CIRCUIT

The circuit is shown in Fig. 1. With the exception of the power supply, it is basically the same as that of the original instrument. The oscillator itself is the Split-Colpitts. Power is obtained directly from the 117-volt a.c. line; however, complete isolation is included in order to eliminate the hazard of shock. This is accomplished by by-passing the negative of the power supply to the metal shield case with a 0.002 μF. capacitor (C7). At first a 0.02 μF. capacitor was used and, although its reactance at 60 cycles was sufficiently high to limit the current below the minimum safe value, enough "tickle" was experienced between case and ground to scare one into dropping the instrument. No sensation is experienced using the 0.002 μF. capacitor, even with wet hands.

Although headphones are usually completely insulated, an additional precaution has been included for their use. When the phones are plugged into the jack, a 50,000 ohm resistor (R4) is automatically inserted in the grid return to reduce the maximum possible current below the minimum safe value. The sleeve end of the jack is also connected to the case through a 0.002 μF. capacitor (C6). The resistor could be left in the circuit at all times and the phone jack could then be connected across the resistor through a small capacitor, but the grid current would then be too low when utilising a 0-1 mA. meter. (A 0-200 μA. meter would be the obvious solution, but a 0-1 mA. meter costs less.)

Plate power is obtained through a half-wave selenium rectifier and RC filter. A resistor line cord of the correct value to operate 6.3v. 0.15 amp. tube was not obtainable; therefore, a resistor (R5) is connected in parallel with the tube filament to enable the use of a standard 390-ohm line cord. In the event of the line cord becoming defective, it may be easily replaced at the Jones power plug instead of requiring internal soldering of connections. When 117 volts a.c. is to be used, a jumper must be connected between terminals 1 and 4 of the line plug to connect the internal parallel filament resistor. When battery operation is to be employed, the jumper is omitted, removing the resistor and thereby reducing the filament battery drain.

The original Dipper utilised a 955 acorn tube which was soldered in place to eliminate socket inductance and thus increase the upper frequency limit. From a practical standpoint, it was deemed advisable to employ a tube with a socket. The 9002 was chosen because, compared with the 955-plus-socket, it

* Reprinted from "CQ", Feb. 1949.

1 Scherer, "The Dipper", "CQ", May 1947.

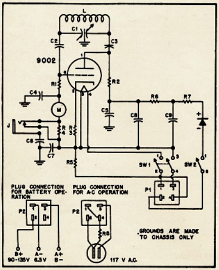


Fig. 1.—Circuit diagram of the Improved Dipper.

C1—100-100 pF. miniature split-stator.
C2, C3—60 pF. silver mica button.
C4, C5—500 pF. silver mica button.
C6, C7—0.002 μF., 600 volts.
C8, C9—Dual 20-20 μF., 150 volts.
R1—15K, ½ watt.
R2—10K, ½ watt.
R3—200 ohms, ½ watt.
R4—50, ½ watt.
R5—39 ohms, 1 watt.
R6—2250 ohms, ½ watt.
R7—400 ohms, ½ watt.
R8—390 ohms, line cord resistor.
J1—Closed single circuit midget.
M—0-1 mA. meter, 1½ inch.
P1—Jones receptacle.
P2—Jones plug.
SW1—DPST toggle.
SW2—SPST toggle.
Rect.—100 mA. selenium rectifier.
L—A: 110-275 Mc.—see Fig. 4.
B: 48-130 Mc.—2¾ turns of No. 22 enamel, ⅛ inch between turns.
C: 26-65 Mc.—8¼ turns of No. 22 enamel, space wound.
D: 13-32 Mc.—15¾ turns of No. 26 enamel, close wound.
E: 6.4-16 Mc.—30¾ turns of No. 32 enamel, close wound.
F: 3-7.5 Mc.—67¾ turns of No. 38 enamel, close wound.
G: 1.7-4.5 Mc.—160¼ turns of No. 38 enamel, close wound, undercut on coil form must be ⅞ inch long instead of ½ inch.

takes up less over-all space and with a given high frequency coil it will oscillate at about the same frequency.

CONSTRUCTION

The material used for the case is 0.040 inch No. 2S half-hard aluminium. Other material such as copper may be used. The bending can be done easily in the home workshop as follows: Using a pair of "C" clamps, secure the material between a pair of steel bars, or right angle stock, aligned with a scribed line where the bend is to be made. The bars should have a smooth and clean right angle edge. Place the bars securely in a vise and bend the material, using a heavy wood block for leverage. This will make a bend that is slightly round at the edge. To true up the edges, place a flat piece of steel on top of the bend and hammer the steel piece until the bent edge is clean and sharp. The "C" clamps are used only to keep the bars aligned with the scribed line until they are placed in the jaws of the vise. When making the scribed lines, allowance must be made in the dimensions for a slight loss in the bend. Before making the final bends, it may be wise to make a few practice operations with scrap metal.

Dimensions of the case are: Length $5\frac{1}{8}$", width $2\frac{1}{4}$", depth $2\frac{3}{8}$". The depth will depend on the size of the condenser (C1) used.

The case is made in the shape of a long "U", with a side plate measuring $5\frac{1}{8}$" x $2\frac{3}{8}$" with two flanges along the long edges. The bottom plate is $2\frac{1}{4}$" x $2\frac{1}{2}$" with flanges round all edges.

The top of the case is a piece of polystyrene, $\frac{1}{4}$" thick. The coil mounting posts are located in the polystyrene, but they should not be drilled until the variable capacitor is installed and their location is determined, bearing in mind that the length of the leads from the coil socket to the condenser must be as short as possible.

The meter shown in the photograph is a surplus $1\frac{1}{2}$" meter and should be mounted from the rear of the hole in the case with the flange on the rear side so only the round lip of the meter face protrudes through the case.

The coils are wound on $\frac{1}{2}$" polystyrene rod. Dimensions are given in Fig. 2. Each coil must be undercut approximately 1/32" where the wire is to be wound to allow passage of the polystyrene sleeve over the coil. If a lathe or machine shop is not available for this work, the sleeve may be omitted. In this case, if protection and insulation are desired, the coil should be coated with coil dope and then wrapped with scotch tape.

At the top of the coil-form a hole (No. 48) is drilled through its diameter. A slot is then cut with a hack saw, about 1/16" deep from this hole lengthwise down the side of the rod. This will make it possible to bring the lead from the top of the coil through the hole and down under the coil to one of the banana plugs on the base. The other lead from the coil is then brought through a hole drilled at the bottom edge of the coil and at right angles to the tope hole. Another slot is cut from the lower hole so the sleeve will clear the lead running from this hole to the base. Each coil should be coated with coil dope.

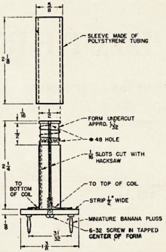


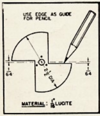
Fig. 2.—Dimensions for the Dipper plug-in coil forms.

When selecting the material for the coil forms and the sleeves, be sure the sleeve will slide snuggly over the rod. Before installing the sleeve, the coil dope must be dry to prevent smearing of the sleeve. Slide all but $\frac{1}{8}$" of the sleeve over the coil form and, to cement it in place, put a drop of coil dope on either side of the form at the base of the sleeve. Slide the sleeve on until the top is flush with the top of the coil form. Place a coat of coil dope over both the edge of the sleeve and the coil form at the top.

The coil form is screwed to the plug-in base; however, coil dope should also be used as cement at this point to prevent accidental twisting of the rod and subsequent breaking of the leads running to the banana plugs. The banana plugs shown are those used in the ARC5 series of surplus equipment and are press fit and peaned in the plug-in strip. Other types of banana plugs may be used.

Dimensions of spacing for the banana plugs are given, but these should be first checked against the actual spacing between the receptacle holes after the coil posts are mounted.

The dial for the instrument is made of 1/16" thick lucite and is $2\frac{1}{4}$" in diameter. The fiducial line is scribed across the diameter and is then filled with black wax crayon. The dial is screwed to a standard $1\frac{1}{8}$" knob which is supplied with three screw holes for this purpose. Before the regular dial is permanently mounted, a substitute



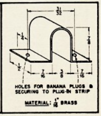


Fig. 3 (left).—Substitute calibration dial to enable marking of the permanent scale.

Fig. 4 (right).—Dimensions and method of construction for 110 to 275 Mc. inductance.

calibration dial is first installed. This is shown in Fig. 3. It is cut out along its diameter to permit marking of the scale during calibration, using this edge as a guide for a hard pencil. The scale is made of white Bristol drawing board and is cemented to the case.

TESTING

Before testing the Dipper, connect an ohmmeter to the two terminals on the 117v. a.c. plug. Turn on the filament switch, and without the 9002 in its socket, the ohmmeter should read 430 ohms. This is the total series resistance of the line cord resistor and the parallel filament resistor. If this reading is not obtained, the filament resistor is not connected across the filament terminals. This should be checked to prevent damage to the tube. If the ohmmeter reads around 40 ohms, the resistor leg of the line cord is most likely incorrectly connected.

If the filament circuit is properly hooked up, insert the tube in the socket, plug the line cord into the 117v. a.c. line and turn on the filament switch. The 9002 filament should light. Measure the filament voltage at the socket terminals. It should be 6 to 6.3 volts.

As a personal safety measure, connect a 1000 ohm-per-volt a.c. voltmeter between the instrument case and ground (water pipe, radiator, etc.). If no reading is indicated on the meter, reverse the a.c. plug. The voltmeter reading should be no more than 10 volts. If the voltage is higher than this, either there is a short between the case and one side of the 117 volt line, or the isolating bypass C7 is incorrectly wired or of the wrong value.

Insert the lowest frequency coil into the posts and turn on the plate switch. Grid current should be indicated on the meter and should vary between 0.6 mA. and 0.9 mA. over the tuning range of the variable condenser. The other coils should be checked in order. It will be noticed that the grid current will be higher with the next lower frequency coil and then will drop off as each higher frequency coil is used. The highest frequency coil will vary between 0.1 and 0.3 mA. In all cases the grid current variation should be gradual.

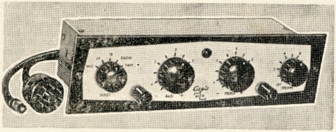
The plate voltage should be measured between the B+ terminal on C5 and the negative side of C8-C9. This should be approximately 117 volts. If the grid meter reading is too high (off scale) when using the lower frequency coils, it may be reduced by increasing the value of the grid resistor R1.

CALIBRATION

Calibration may be made using either an absorption-type frequency meter, a calibrated receiver, or a receiver in conjunction with a secondary frequency standard.

The following method is employed with the absorption meter. First, to check the range of each coil, set the Dipper capacitor at minimum and, with the absorption meter loosely coupled to the Dipper coil, adjust the absorption meter to the point where the Dipper's meter shows a marked dip. This then indicates the highest frequency attainable with the particular coil in use. The same procedure is followed for checking the low frequency

(Continued on Page 45)



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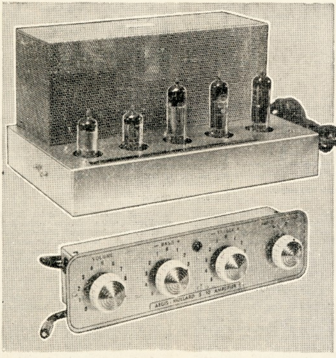

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THE TA2 SPECIAL

(Continued from Page 11)

suppression (approximately 40 db.). The presence of excessive carrier shows on the wave-envelope pattern as a difference in height on two adjacent peaks, with the "bow tie" or trapizoidal pattern an unbalance in height will be noted.

The above explanation is only an effort to help you understand what happens in this circuit. Even though you may not understand all of this or may not have even seen an oscilloscope, there is no reason why, by following a few simple ground rules, your end product can not be good.

It has always been a source of amazement to me that following the articles in "QST" in 1951 on d.s.b.r.c. there was not an immediate interest developed in this new technique. On paper it looks like the answer to the phone man's prayers. At this late date, however, I believe that I know the answer. Those few of us that tried d.s.b.r.c. in an effort to obtain peak efficiency operated in the 300-400% modulation range. At this level, except when the fellow receiving the signal uses a crystal filter or Q multiplier in a sharp position (this exalted carrier's reception restores the unbalance between the carrier and sidebands) the audio distortion is quite pronounced.

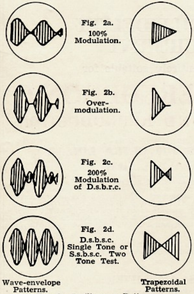


Fig. 2a. 100% Modulation.

Fig. 2b. Over-modulation.

Fig. 2c. 200% Modulation of D.s.b.r.c.

Fig. 2d. D.s.b.s.c. Single Tone or S.s.b.s.c. Two Tone Test.

Wave-envelope Patterns. Trapezoidal Patterns.

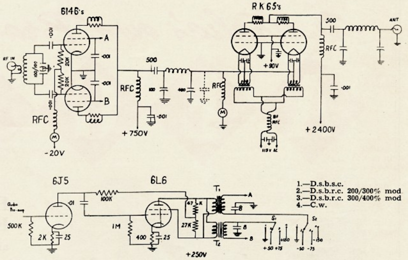
Fig. 2.—Oscilloscope Patterns.

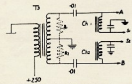
Recently I have accepted a reduction in over-all efficiency and have operated mostly in the 200-300% modulation range. At this level, even with the usual i.f.'s. (6-12 Kc. bandwidth), distortion is negligible, or at the worst, acceptable. I should add here that the use of speech clipping is an important factor in reducing distortion.

When using d.s.b.r.c. most stations worked, even before being given information on my rig, remarked on the audio level being high in comparison with the carrier. One station said recently, "My S meter shows S3 but your audio sounds like 20 db. over 9". Others remarked that my signal stands out like a "sore thumb". This is, in part, because the a.v.c. action in the normal superheterodyne receiver is controlled by the carrier level and since the carrier level is reduced in d.s.b.r.c., the a.v.c. action does not fully compensate for the strength of the signal. Others have noted that my audio completely swamps other interfering a.m. signals with equal carrier strength.

I do not want to go into detail on d.s.b.s.c. except to say that the results have exceeded my expectations. Anyone familiar with the technique of receiving s.s.b. has little or no trouble receiver for best audio. The b.f.o. pitch control can be trimmed slightly for best results. A few minor adjustments to tuning is not too bad, but if you are continually adjusting because of poor receiver stability it is quite objectionable. You will find that being off a little may make voices sound unnatural but it is not too serious as far as the intelligibility is concerned.

The v.f.o. exciter used in my case is a re-built Command Transmitter (BC 457) with 1-3 watts output on 40, 20, 15 and 10 metres. The only requirement to remember here is that the





Possible alternate 6L6 output.

T1, T2—Driver transformer, adjustable ratio.
Note.—T1 and T2 must be connected so that the secondary voltages add, between terminals A and B. The full secondary winding is used, and primary taps are selected to give a turns ratio, primary to whole secondary, of 1.5 to 2.

T3—Replacement power transformer (50 to 600 cycles OK).

Ch1, Ch2—Small filter chokes, 10 to 20 H.

R1, R2—5K to 25K (may be desirable to reduce audio distortion).

Fig. 3.—"TA2 Special"

with d.s.b.s.c. By using the crystal filter or Q multiplier to sharpen the bandwidth, most of the unwanted sideband is eliminated and phase distortion caused by being slightly off in tuning is relatively small. Reports on my signal, with reference to the audio and cleanness, have in almost every case been most complimentary. Most s.s.b. "types" say that they are all for anything that eliminates the carrier.

Now on the practical side of things. I will try to give sufficient information so that without test equipment you can duplicate my results. For best results your receiver should have good frequency stability and should have at least a crystal filter, Q multiplier, or some other method of giving you sharp band-pass. Two or three kc's. is about optimum. If you would like to check your receiver on some s.s.b. signals, back off the r.f. gain, open up the audio gain wide and turn on the b.f.o. For best results I tune my b.f.o. pitch control approximately 1000-1500 cycles plus or minus depending on the sideband (upper or lower) and tune the oscillator should have good frequency stability. Crystal control would beat the stability problem but since most s.s.b. contacts take place on the same frequency, sooner or later you will want to go v.f.o. Fig. 3 is a simplified circuit of my "TA2 Special". The comments here in reference to this transmitter, except for the differences in specific voltages and currents, should generally apply to the proposed medium-power version in Fig. 1.

In general, standard procedure can be used in building the transmitter except in locating parts an effort should be made to keep the r.f. lead lengths symmetrical in the push-pull input of the balanced modulator. Experience has shown that better carrier suppression on d.s.b.s.c. is obtained by using separate grid resistors. The two I used were checked with a volt-ohm-meter to be sure that they were the same resistance. If satisfactory carrier suppression does not result, a little trial and error may be in order; however, with this circuit it should not be necessary.

The pi-network between the balanced modulator and the grounded grid linear was used to make possible a good impedance match and to permit adjusting the load of the balanced modulator. **The proper loading of both the balanced modulator and the linear amplifier is the real key to success in this transmitter.**

There are a number of ways to isolate the filament of the grounded grid final from r.f. ground. My method is a compromise to make it possible to use existing parts. A bifilar wound choke in the secondary might be better (commercial units are available in the U.S. from Barker and Williamson, Inc.). My filament transformer was a high voltage rated open-frame type with two 2½ volt windings in series. The capacity between the secondary and primary was approximately 100 pF. This gave satisfactory results on 40 and 20 without the r.f. choke in the primary. However, the additional choke was necessary to reduce losses on 15 and 10 metres.

When the linear was first tried, both the control grids and the screen grids were directly grounded, which gave a static plate current of only 20 Ma. at 2,400 volts (others have reported static plate currents as high as 40 Ma.). As I found the linear somewhat hard to drive, I tried using positive voltage on the screen grids and found 90 volts to be optimum. In my case this gives me 100 Ma. standing plate current on the two RK65s. It was easy to drive the linear to a full kw. peak input under these conditions and having a meter to read screen grid current was a real boon to loading and resonating the final. Unless some method is available to indicate r.f. power out, tuning for maximum screen grid current is the only way to be sure the final is at resonance.

TUNING UP

Now we are ready to tune up the rig. I hope, for the sake of your fellow Hams, that you have a dummy load for this purpose. If you are fortunate enough to get hold of some "Globar" non-inductive resistors, or the equivalent, you will find that it is worthwhile to duplicate the simple unit (Fig. 4) that I used. Electric light bulbs are a last resort as their resistance varies with input.

In any case, start off with the balanced modulator coupled to a dummy load or antenna. Approximately 50 ohms is best as that is close to the input impedance of the grounded grid linear. Use Position 3 for tuning up, adjust the drive to the grid circuit for approximately 5 to 6 Ma., dip the final and increase loading by reducing the output capacity of the pi-network while keeping the final in resonance until the power output no longer increases with an increase in loading. At this point you should have approximately 45 Ma. plate current. There is only a relatively small increase in plate current from the no-load conditions.

Now, slowly increase the audio gain until the plate current is kicking up to about 75 Ma. on voice peaks. To be sure you are not "flat topping", a sharp whistle should drive the plate current to approximately 150 Ma. If the plate current does not go up high enough on a whistle, a further increase in loading should do the trick. This setting should give you approximately 250% modulation.

A word of warning here if you do not want your tubes (6146s) to go soft as my first pair did. In spite of the relatively low plate current, it is easy to exceed the safe plate dissipation of the 6146 with positive s.g. voltage operating as it is at relatively low efficiency. In an effort to get more output from my balanced modulator on d.s.b.r.c. I tried operating at 900-1000 volts. The slight show of red on the plate should have been warning enough, however, it was not until my tubes started to go soft after about three months of operation that I decided that 800 volts was my limit on Position 3. 900 volts was found to be safe on Position 2. With d.s.b.s.c. (Position 1) I have found that my full 1100 volts is quite safe. When going to Positions 1 and 2 from Position 3 a slight reduction in audio is necessary. In Position 2 the standing plate current will be approximately 38 Ma. with 900 volts and voice peaks will hit between 60 and 90 Ma., depending on the percentage of modulation desired. In Position 1 a standing plate current is about 30 Ma. at 1100 volts and the plate meter hits approximately 100 Ma. on voice peaks.

approximately 40 db. on the S meter of my HRO-60, and down to about S5 or 60 db. down on the seventh order products. This was almost too good to be true as 25 db. down on the second and third order is not considered too bad. Rough on-the-air checks showed very low distortion products but I doubt if it is as good as the —40 db. indicated by my tests. The adjustment that did the most in reducing my distortion productions (from 20 to 40 db. down) was the reduction of the fixed bias on my balanced modulator from —60 to —20 volts. I do not know exactly why this should have made so much difference.

We are now ready to load the grounded grid amplifier. When connected to the final, the loading of the balanced modulator should be readjusted using the same procedure as outlined above. This is necessary because the input impedance of the grounded grid linear will probably be different from your antenna or dummy load used in the previous test. Using Position 3 again, load your final much the same way as you did the balanced modulator. It will be necessary to increase the loading up to or past the point of maximum output. When properly loaded in Position 3, speech audio will result in the p.a. plate current kicking up from approximately 160

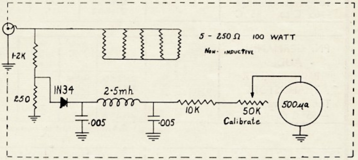


Fig. 4.—Dummy load with output meter. Meter calibrated for 150 r.f. volts at full scale.

At this point some "on-the-air" checks, using the balanced modulator, is in order, or better still, check your own signal as I did. With the rig loaded into a dummy antenna and the antenna removed from your receiver check for distortion products (splatter). If you happen to have a sharp receiver with an S meter and a 1000 cycle signal audio tone to excite the transmitter, switch to Position 1 and increase the audio until the plate current is approximately 100 Ma. With the crystal filter or Q multiplier in a sharp position, locate one of your fundamental sidebands and adjust your r.f. gain so the S meter reads approximately 40 db. over 9. Now tune slowly away from the carrier frequency. One kc. off you will find your second order distortion product. One kc. further you will find your third order distortion product, and on down the band you will hit fourth, fifth, sixth, etc., distortion products.

Being careful not to damage your tubes, this test should be repeated with 150 Ma. plate current. In my case, with 150 Ma. plate current, I found the second and third order products down

Ma. to 275 Ma. and whistles up to approximately 400 Ma. These, and other current figures, are for 15 metres and somewhat higher but proportional readings will be found on lower frequencies. The check for distortion should be repeated as before. If the final amplifier is operated properly, little or no increase in distortion products will result. In my case, I do not find it necessary to make any adjustments in loading between Positions 1, 2, and 3. A reduction in loading of the balanced modulator and grounded grid linear will probably be necessary in Position 4 for best efficiency on c.w.

Although my versions of the "TA2 Special" may be too much power for most, for those who wish a simpler and lower power version, I would suggest a pair of 6BQ6s or 6DQ6s for the balanced modulator with two or three 837s for a grounded grid linear, as shown in Fig. 1. This would give something in the order of 200-500 watts input. The 837s are "tried and true" in grounded grid service, and the 6BQ6s worked well in d.s.b.s.c. and should be okay for d.s.b.r.c.

(Continued on Page 46)

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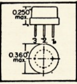

JETEC-30 Type	V_{CE} max. volts	$f_{\alpha b}$ ave. Mc	Beta ave.	C_{ob} ave. $\mu\mu f$	r_b'' ave. ohms
2N413	−18	2.5	25	12	70
2N414	−15	6	40	12	80
2N416	−12	10	60	12	90
2N417	−10	20	80	12	100

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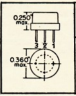

JETEC-30 Type	V_{CE} max. volts	Beta ave. small signal	Power Gain Class A ave. db	I_{CO} ave. μa	Noise Factor ave. db
2N422	−20	90	40	6	6 max.
2N464	−40	22	40	6	12
2N465	−30	45	42	6	12
2N466	−20	90	44	6	12
2N467	−15	180	45	6	12

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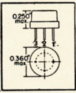

Type	Circuit Usage	Supply Voltage max. volts	Power Gain Class A db	Power Gain Class B db
2N359	Output	−16	40*	37‡
2N360	Output	−16	37*	34‡
2N361	Output	−16	34*	31‡
2N362	Driver	−16	41◆	—
2N363	Driver	−16	37◆	—

*@ 50 mw. 9 volt supply ‡@250 mw. 9 volt supply ◆@ 1 mw. 9 volt supply

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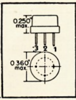

Type	Circuit Usage	V_{CE} max volts	I_{co} max μA	r_b'' ave ohms	C_{ob} $\mu\mu f$	Gain 455Kc db	Conv. Gain db
2N481	Osc.	−12	10	70	12 ave.	—	—
2N482	IF	−12	10	80	12±2	31	—
2N483	IF	−12	10	90	12±2	35	—
2N484	IF	−12	10	100	12±2	39	—
2N485	Conv.	−12	10	80	12 ave.	—	26
2N486	Conv	−12	10	90	12 ave.	—	30

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AMATEUR TELEVISION

PART EIGHT

BY E. E. CORNELIUS,* VK6EC/T

A VIDEO OSCILLOGRAPH

During early experiments with a flying spot scanner on 245 lines and a 1 Mc. bandwidth, a Dumont c.r.o., with a bandwidth 3 db. down at 100 Kc. was used. This proved a severe limitation, and over a period, a number of requirements for a c.r.o. suitable for this work, were formulated. These were:—

1. Y bandwidth **flat** to 5 or 6 Mc., calibrated in volts per inch.
2. Sweep—a hard valve time base for reliable triggering, calibrated in frequency, and a triggered sweep for pulse measurement, calibrated in time, with calibrated trigger time delay.
3. Z axis modulation facility.
4. Direct on plates shift controls.
5. "Earth free" operation facility.
6. Zero line insertion.
7. Remote power supply.

These features were all incorporated, but each had its price, either in complexity or cost.

1. A 6 Mc. bandwidth involved low gain video amplifiers, with power tubes as deflection amplifiers, to obtain adequate deflection. This called for a sizeable power supply, about 250 mA. Using push-pull 6CL6s with 400 volts h.t., only 2" undistorted Y deflection could be obtained at 6 Mc. bandwidth.

This is adequate, but for greater deflection, the anode loads are switched in steps to permit up to 6" deflection, with a 2 Mc. bandwidth. To maintain 6 Mc. bandwidth, with high input impedance, at all levels, a compensated step attenuator was introduced at the input socket, at the front panel. It is switched on a 1, 3, 10, 30 . . . basis, feeding a cathode follower. This enables a low impedance co-axial to be used to take the signals to the rear, where the main amplifier is situated. It also permits the use of a potentiometer type gain control, also calibrated in voltage, as a vernier, near the main amplifier.

This amplifier is a 6AU6, 6CK6 to push-pull 6CL6s, all using standard video techniques. The 6CL6s are a "long tailed pair" push-pull circuit, with signal injected to the grid of one. This leaves the grid of the other unused, which permits a useful facility outlined in 3 below.

At full bandwidth, the maximum sensitivity is 0.4 volt per inch, and 0.13 volt per inch on the 2 Mc. bandwidth. It was not considered worthwhile to add another video stage for greater sensitivity. For gain stability, and a stable display, regulated h.t. was now essential.

2. **X Deflection.**—A reliable hard tube time base was incorporated using a Miller circuit, with a range from 10 c.p.s. to 200 Kc. The deflection amplifier is a 6SN7, also in a "long tailed pair" circuit. The Miller transitron readily lends itself to triggered operation, but this, together with the trigger delay facility, is costly in tubes, nine being required, counting the sync. amplifier.

* 157 Wood Street, Inglewood, Western Aus.

This could be simplified considerably, by a diligent search of the literature and considerable thought and experiment, but as it has worked well for three years, I have not as yet made time to attempt simplification.

The beauty of the Miller circuit is that the sawtooth is remarkably linear and almost completely independent of tube parameters, and provided regulated h.t. is used, with stable components, can be calibrated accurately in frequency, time, and time delay.

As the fastest triggered sweep is 20 μsec. and must be linear, the deflection amplifier has to be reasonably wideband. This limits the X amplitude to about 7". This has been no disadvantage. On triggered sweep, the sweep width is adjusted by the components always to be 4", and the width control bypassed. The trigger delay is also directly calibrated in time from 5 μsec. to 17.5 msec., by a calibrated potentiometer, and multiplier.

3. Z axis modulation (c.r.t. grid) was considered to be a desirable feature, but has hardly ever been used. But it was seen on design, that it would be easy to switch the Z amplifier to the otherwise unused grid of the Y deflection amplifier, and effectively have two independent Y channels.

This amplifier is a single 6AC7 with about 1 Mc. bandwidth, and has proved invaluable for a type of "double beam" display for waveform superimposition, but without any separation of the two traces. No compensated input attenuator is provided, the high impedance input being direct to the grid of a cathode follower and then via co-axial cable to a low impedance gain control to the amplifier input at the rear. This circuit limits the input voltage to the effective grid base of the cathode follower, about 25 volts peak to peak.

4. Direct on plate shift controls mean that the shift potentials are fed direct to the c.r.t. plates, independently of the amplifiers. This avoids the probability of distortion on extreme shifts, when the shift potentials are fed through the amplifiers, but involves dual potentiometers and slight sluggishness of the shift.

5. In t.v. it is often desired to observe a waveform of low amplitude at a circuit point at high d.c. potential, possibly with ripple superposed. This is particularly so when measuring the current in line and frame deflection circuits. The normal power supply ripple, or ripple caused by the line or frame time bases themselves, can completely mask the waveform to be seen, when measured against earth.

It is adviseable therefore to be able to lift the whole c.r.o. circuit above earth potential and operate the earthy terminal at (say) h.t. potential (complete with ripple). This leaves the desired waveform clean for observation. The practice can be highly dangerous, of course, unless precautions are taken.

The whole of the power supply circuit, and c.r.o. "innards" are left free of earth and the c.r.o. chassis assemblies insulated from the main case, which is earthed. A 0.1, 600v. capacitor is connected between the c.r.o. earth and true earth, with a panel-mounted switch across it.

Throwing the switch to "FREE" (open) allows the low potential connection of the c.r.o. to be connected to points up to 600 volts "hot", the only hazard then being the c.r.o. input terminals themselves, in this case co-axial connectors, which are insulated from the case and as protected from accidental contact as possible. A worthwhile refinement would be to have a conspicuous red panel lamp to light under "EARTH FREE" conditions.

This facility has proved invaluable, and is in use continuously. Note that many of the test points (t.p.) shown in earlier circuits have been at high potential, and in these cases the c.r.o. is clipped across the measuring resistor under "free" conditions.

6. Zero Line insertion was discussed in Part Seven last month. The vibrator is plugged into its socket which is close to the Y_2 (Z) input (the narrow bandwidth channel) and short circuits the co-axial input socket for dotting in the baseline. It was included in this channel to avoid adding extra capacitance to the wide band Y_1 channel. Not that this vibrator must be connected directly across the input connector, as any point after a coupling capacitor loses the d.c. component it is designed to show.

7. By the time all these facilities were included, the total of tubes was considerable and power supply requirements in proportion. The proximity of a 5BP1 to a power transformer always raises the problem of shielding the tube, so it was decided to use a separate unit for the power pack and mount it remotely, on the floor for instance. This minimised trouble from magnetic deflection of the c.r.t. and made two units of reasonable weight, easier to handle than one very heavy unit.

CIRCUIT

The circuit is shown in Fig. 40.

Y Amplifier

V1A and B, mounted on the Y attenuator shield, are the two input cathode followers, co-axial cables leading to the rear panel, where the video amplifiers are located. The Y_1 channel is V2, V3, feeding the grid of V4, which with V5 is the deflection amplifier. V2 and V3 use I.R.C. 1000 ohm 3w. wire wound resistors for anode loads, which provides excellent compensation in this layout, flat to 6 Mc. Pure chance of course! V4 and V5 also use the same resistors for anode loads, 2000 ohms for 6 Mc. bandwidth, 4000 ohms for 3 Mc., and 6000 ohms for 2 Mc. Additional shunt inductors are switched in for the narrower bandwidths. The 20 ohm cathode resistor provides bias, and the 1000 ohms the "long tail" for cathode drive to the second tube.

The grid of V5 is normally earthed to signal by a 0.5 μF. capacitor, but via

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S4 can accept signal from V6, as the 1 Mc. bandwidth Y_2 channel, for that second input. The arithmetic sum of the waveforms is displayed, the two traces not being separable on a true double beam basis, but very useful for all that. The other position of S4 allows grid modulation from V6, for marker pips, or switched free for convenience. The Z (Y_2) input co-axial connector has the zero line vibrator across it, as mentioned earlier.

Time Base

The time base can run either under continuous or triggered conditions. Under continuous sweep, V7, 16, 17 and 18 are used. V7 is a sync. amplifier, reasonably wide band, with either internal sync. (from the cathodes of V4, 5) or external sync. from the sync. input socket. It feeds to V16, a Miller integrator, followed by V17, a cathode follower. The cathode follower is in series with the Miller capacitor, selected by S9. It has a number of advantages, among them a considerable improvement in fly back time, and its low impedance output.

On continuous sweep, a 0.047 μF. capacitor is switched between screen and suppressor of V16, by S10A and S10C. This provides a transitron circuit for free running, sync. being injected at the screen. The sawtooth frequency is controlled by the time base fine and coarse controls, arranged to multiply each other, and is taken from the cathode of V17 via a co-axial cable and width control to V18. This is another "long tail" circuit, with unequal plate loads for equal plate voltage swings and unequal bias on the grids, for optimum grid base for each tube half.

Triggered Sweep

On "Trigger", V16 is no longer free running, the screen being bypassed, and a "gate" pulse is applied to the suppressor through a diode biassing circuit (V15B). The Miller tube is cut off, with high anode potential, until arrival of the trigger, when the suppressor goes positive, and the anode potential falls linearly until the gate is again closed, by suppressor cutoff, the anode flies positive, until the next trigger. A negative going sawtooth, of duration fixed by the gate pulse width and amplitude fixed by the Miller capacitor (selected by S8B), is available from the cathode of V17.

The generation and control of the gate pulse is the job of the circuitry of tubes V8 to V15 inclusive. The trigger signal is amplified as before by V7 and fed to V8 via S5B. The two diodes are poled and biassed to conduct at a specific voltage, preset by the potentiometers under S6B, and polarity selected by S6.

On conduction of the diode, V9 cycles. This tube is a flipflop, emitting a negative pulse of duration about 4 μsecs., on receipt of a trigger. Switch S6 selects either the positive going or negative going component of the triggering pulse, and switches other circuits to maintain correct polarity throughout. S6A selects the appropriate input polarity. S6B alters the bias on V9A so that this stage is cutoff before a positive pulse, or conducting before a negative. S6C and S6D select the negative going anode of V9 for either polarity input, feeding it to the delay circuit V10, 11, or undelayed to V13.

Trigger Delay.—This is another flipflop whose cycle duration is under control from the panel by the switched delay capacitors in S7A and the fine control, a 2 megohm potentiometer designated "MICROSECONDS". V12A acts as a clamp for the suppressor of V10, to ensure the suppressor always returns to earth potential, preventing random variations in pulse length and hence the delay, causing "jitter".

V13 accepts the delayed or undelayed pulse, it being differentiated to a spike by the 14 pF., 47K circuit in its grid. The tube amplifies and inverts the pulse, and the spike, now positive, is fed via V12B to the gate flip-flop V14. This cycles on each spike, emitting a square gate pulse, positive going, from the anode of V14B.

Two outputs are taken from the anode, one clamped by V15B to cut off the suppressor of the Miller tube, and the other clamped to +110 volts, to the c.r.t. grid, as a "brightup" pulse for brightening the trace for the duration of the sweep.

The tricky parts of this circuit are:—(1) The trigger flipflop V9, where some juggling of the values of the cathode resistor and the grid resistor of V9B (shown as 33K) may be needed. (2) The gate flipflop, where similar juggling is necessary for the grid resistor of V14B, shown as 220K and 1M in parallel.

On triggered sweep, the X gain control is bypassed, as it can distort the short duration sawtooth. The width of the trace is adjusted as close to 4" as possible by adjustment of the value of the capacitors switched by S8B. Then, with 4" of sweep for each duration, the graticule will measure specific times. For instance, on 20 μsecs., it will be 5 μsecs. per inch.

With triggered sweep, the beam is undeflected till a trigger pulse is received, then sweeps across the screen at the predetermined rate and then awaits the next trigger pulse. No trigger, no sweep. The sweep delay acts as a very fine and flexible sweep expansion, as varying the delay moves the whole display bodily across the screen. A delay of 1000 μsecs. on a sweep of 20 μsecs. is possible, and equal to an expansion of 50 times—17 feet!

Power Supply

No circuit of this is given as it conforms closely to the other power units described. It supplied +400 volts unregulated at 100 mA., +260 volts regulated at 120 mA., +110 volts regulated at 20 mA., —2000 volts from an r.f. e.h.t. supply, and —70 volts for bias of V13. This last is obtained by having the whole of the filter system in the negative leg, using it as a back bias resistor. With the components used, this gives —70 volts, and the components of V13 were adjusted to suit. As in the c.r.o. proper, the earth bus floats and is connected through to the c.r.o. cabinet for earthing there via the "EARTH FREE" switch.

The filament supplies are similar to other circuits, allowing adequate insulation for the 5BP1 filament, and a separate winding for V4, 5, 11 and 18, this being kept at +110 volts, to reduce heater cathode potential in these tubes. The +110 supply is derived from a series regulator tube which has its grid held at +105 volts from the OC3 reference tube used for the main regulator, similar to the +150 supply in the c.c.u. power pack.

Mechanical

To provide the "earth free" facility, the whole of the c.r.o. circuitry was mounted on a separate inner carcase, mounted within and insulated from, the metal outer case, which measures 14" x 10" x 8". See Fig. 41.

The inner carcase was therefore constructed as follows:—A set of 5 vertical panels, all to the same outside dimensions of 13¾"" by 9", with ⅜" flanges all round, are used as chassis and mounting panels. They are spaced at intervals shown in the sketch and held in place by angle pieces at each corner from front to back. Each panel is drilled to suit the tubes and components that are to mount on it, with clearance holes for the extension shafts running forward to the front panel.

The carcase has four transverse bakelite bearers 9⅞" x 1½" x 3/16" which are in turn screwed to it at top and bottom, front and rear. These bearers are later screwed to the outer metal cabinet, thus serving to support the carcase inside and insulating it from the case proper. Clearance is provided between the front panel and the front of the case, this last having rubber grommets in ⅜" holes, to support and insulate the shafts projecting through it.

The front panel mounts:

1. The Y_1 attenuator and cathode follower.
2. All co-axial input sockets.
3. The zero line switch and vibrator.

Panel (2) mounts:

1. The c.r.t. shield, and hence the tube itself.

Panel (3) mounts:

1. All the time base circuits, tubes and panel controls.
2. The trigger plus and minus threshold preset controls.

On panel (4) we have:

1. The Y_1 amplifier, deflection amp. and controls.
2. The Z-Y_2 amplifier, access switch and controls.
3. The shift, focus and intensity pots.
4. The astigmatism preset control.

Panel (5), rear, carries the two power receptacles (chassis male) for connection to the external power pack and is back about ⅜" from the rear of the case, which has large clearance holes for inserting the plugs.

Fig. 41 shows the major details of each of panels 1 to 4. Fig. 42 shows the front panel as designated. Note that the front panel of the case has clearance holes for the four co-axial inputs, these being the only danger points under "earth free" conditions.

The first panel has the Y_1 attenuator in a shield case shown dotted, which encloses the Y and Z inputs, and mounts the 12AU7 cathode followers on its rear. The 3 to 30 pF. trimmers on the attenuator are placed so that they are accessible for adjustment via the side doors of the case, for adjustment in situ. The vibrator socket, on standoffs, is immediately above the attenuator box. A cutout at extreme left allows

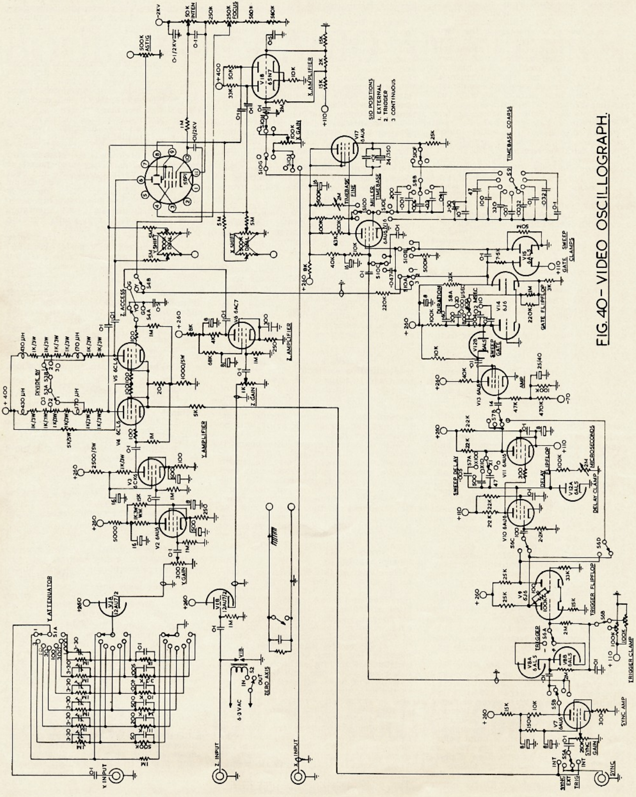

FIG. 40 - VIDEO OSCILLOGRAPH.

clearance for the "earth free" switch, which is the only component mounted on the front of the case proper.

Panel 2 has no components and is mainly used for support of the front of the c.r.t. shield, and the tube. The shield, fixed by brackets to this panel is made of two concentric funnels of 20 gauge galvanised iron, the inner conforming to the shape of the c.r.t. and lined with table baize. The outer slides firmly over it, spaced by a piece of felt. This provides a shockproof mount and grips the tube lightly but firmly.

Panel 3 is for the time bases, with all tubes and electrolytics (coded C on the sketch) projecting forward from the panel, potentiometers and switches being on the rear. The layout is not critical, but that shown allows reasonable access. The wiring of these panels can be done on the panel as a unit, enabling testing to be done in the clear before assembly. For the time base coarse switch S9 and the trigger duration switch S8, an extra dummy wafer was used as a convenient tag plate for the capacitors. Holes coded X, Y, S, on the sketches, are for the co-axial cables from panel to panel.

Panel 4 has the deflection and e.h.t. circuitry, with the e.h.t. network at the top right hand corner, behind the focus potentiometer. The switched anode loads of the 6CL6s are on narrow horizontal tag strips supported by the tube sockets and the "DIVIDE BY" switch. Decoupling and screen dropping components are mounted remote from the tubes on a strip behind the X shift potentiometer. A full length strip across the bottom is used for termination of the power leads and for power distribution. Each of the three active panels 1, 3 and 4 have captive power plugs and free sockets on short cords, to carry power forward between panels.

Cathode Ray Tube

A calibrated graticule for this c.r.o. is easy to make and invaluable. The front panel of the instrument has a 5½" hole, through which the tube may be inserted or removed. It is arranged such that the front of the tube is just flush with the inside of the panel. A circular disk of 1/16" perspex fits neatly into the hole and rests firmly against the front of the tube.

A cast brass c.r.o. bezel from a radar indicator (using a 5FP7) is screwed to the front panel, retaining the perspex

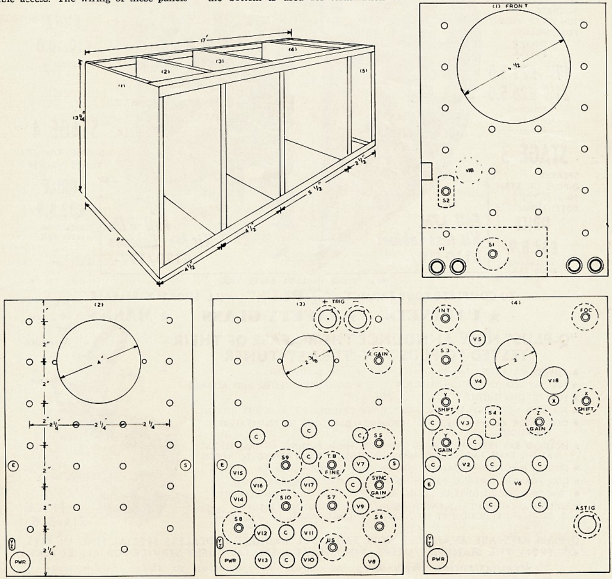

FIG. 41—CONSTRUCTION.

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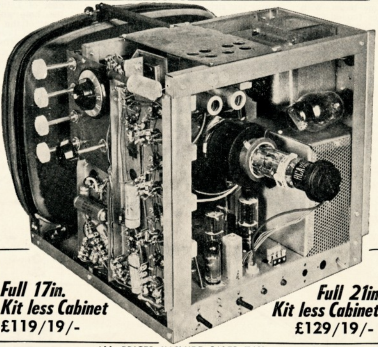

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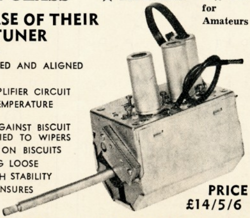

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in place, but allowing rotation with the tips of the fingers for alignment with the trace. The perspex is engraved on the inside, using a sharp scriber, with 1" and 1/10" calibration lines, the 1" marks being deeper than the others. These scribed grooves are filled in black, using a finger moistened with Indian ink, the surplus being polished off when dry.

To improve contrast, a light filter of dark green cellophane is fixed to the tube face itself as described in Part Two for the camera viewfinder, but due to tube face curvature, rather more care is necessary to stretch the cellophane without tearing it. The filter reduces incident light considerably, but passes the green trace almost without loss, enabling the c.r.o. to be used in quite high light levels.

CALIBRATION

After a functional test to ensure that all parts function normally, calibration of the measuring circuits can be done as follows.

The Y Attenuator

The resistor values for this unit should be accurately measured, and while absolute values are unimportant, the ratio of each pair should be accurate, 1 : 2 for the 3 range, 1 : 9 for the 10 range, and so on. The attenuator is frequency independent if the series arm R_1C_1 is equal to the shunt arm R_2C_2, this last absorbing strays. For h.f. compensation, the series trimmer C_1 is adjusted as follows:

Apply a square wave to the input, from the square wave generator described last month, at between 5 Kc. and 15 Kc. If the square wave is obtained from any other source, it must be above suspicion and without overshoot, or rounding. Display the square wave on the one volt per inch range, on 6 Mc. bandwidth, via an attenuator pad made up with resistors of 100 ohms or less, thus ensuring that there is no frequency discrimination there. Use short leads and low capacitance cable. The square wave should be perfect, with no overshoot, undershoot, or rounding.

Set the attenuator to the 3 volt range and adjust the series trimmer to give no overshoot or rounding. The transition will be quite clear and sharp. Check the 10 volt and 30 volt ranges similarly, removing the pad to obtain ½" or more deflection. On the 300 and 1000 volt ranges, compensation is difficult due to the low voltage available, but with the Y gain control full on, and ⅛" on the screen, accurate setting of the compensation is possible. The "DIVIDE BY 3" range may be used, if need be, on the higher ranges to obtain greater sensitivity.

Y Gain Control

Inject a 50 cycle a.c. signal of say 5.0 volts r.m.s., measured on an accurate a.c. voltmeter. This is $5.0 \times 2.8 = 14$ volts peak to peak. Set the Y attenuator to the 10 volts/inch range. Set Y gain to give 1.4" deflection (DIVIDE BY 1 position), and mark Y attenuator setting 1.0.

Using a potentiometer, reduce input to 1 inch (10 volts). Increase Y gain to give 2" deflection and calibrate this point as 0.5. Follow this pattern similarly to give other convenient calibration points.

Time Base (Continuous)

This assumes that all time base capacitors have been checked on a bridge before fitting. Check points on one range will then agree on all other ranges. Set coarse range to 1. Inject 50 cycles per second and display two sine waves, with the absolute minimum of sync. gain to hold the pattern, using the time base fine potentiometer. Calibrate this point 25. Display 3, and calibrate this point 17, 4 for 12½, and 5 for 10. Using other known frequencies, or the more complex Lissajous figures, find the other calibration points on the fine pot., between 10 and 40.

Trigger Adjustment

Inject a low level pulse signal such as line pulses, at about 4 volts level to both Y and SYNC. inputs. Adjust selector to + polarity, and adjust positive trigger threshold selector to give a stable display, with minimum sync. gain. Keep backing off the sync. gain and readjusting the trigger threshold for a stable display until the trigger loses control. Repeat for the negative triggering position. These settings, once found, will not need major adjustment, although an occasional touch up for very low level or very high level signals may be necessary.

On high speed sweep—20 microseconds for instance—the triggering signal itself must have a sharp leading edge. A stable 20 μsecs. sweep from a 50 c.p.s. sine wave trigger is not possible, but is quite feasible from the good sharp 50 cycle driving pulses from your sync. generator.

(Continued on Page 45)

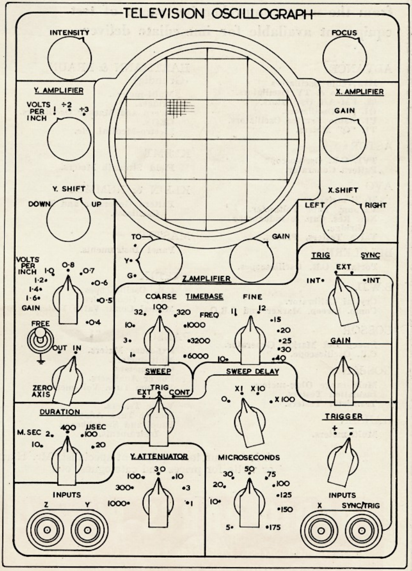

FIG. 42—FRONT PANEL.

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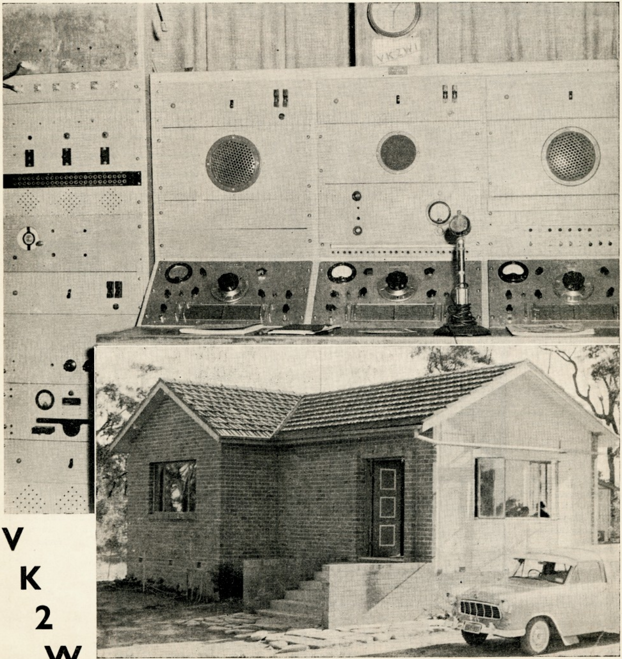

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The Official Station of the New South Wales Division and Central Control Station of the W.I.C.E.N. organisation in that State. Top: Operating Console in the VK2WI Control Room. Bottom: Main Building housing Divisional transmitting and receiving equipment, together with library and other facilities.

VK2WI

Headquarters Station of the VK2 Division and Central Control Station of W.I.C.E.N. in New South Wales

IN Clause 3 of the Memorandum and Articles of Association dated 26th May, 1922, setting out the aims and objects of the New South Wales Division of the Wireless Institute of Australia, Paragraph (g) deals with the establishment of Club Houses and Workshops for use by Members.

It is thirty-six years since these thoughts were put on record. Since then through the efforts of Members in recent years, these thoughts have become an actual fact.

The N.S.W. Division now has an official central focal point located on a five-acre property in Quarry Road, Dural, at the top of a ridge 750 feet above sea level, twenty miles north-west from the heart of Sydney.

The main building is brick tee-shaped construction of 500 sq. ft.; provision has been made to extend to 1,000 sq. ft. This building houses all the transmitting and receiving equipment together with the library and kitchen facilities.

Situated 150 feet to the rear of the main building is a 25 x 14 ft. steel frame building housing a 25 kva. three-phase emergency power plant, work benches and general storage area; underground cables connect the power plant to the main building.

ANTENNAE

Placed in suitable positions well clear of the main building are six 60 ft. tubular steel masts carrying 80, 40, and 20 metre dipole antennae.

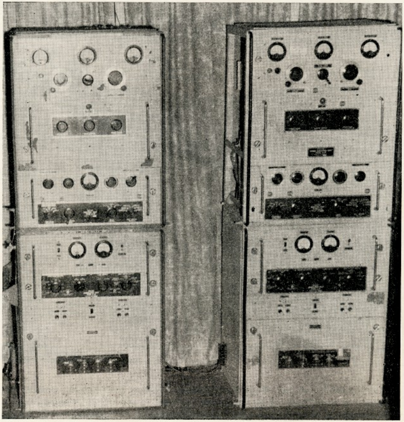
Separate receiving and transmitting antennae are used on these bands, feeders to the transmitting antennae are co-axial cable, run underground to junction boxes on 8 ft. steel poles directly underneath the antennae. From these boxes to the antenna any suitable type of feeder can be used and matched to the co-axial cable.

The v.h.f. antennae consists of a 144 Mc. four-bay turnstile on a 60 ft. pipe mast, for general coverage. A sixteen element phased-array and a five element yagi on 56 Mc., fully rotatable, on top of a 45 ft. pole are close to the main building. The phased array and yagi have been constructed from standard t.v. antenna fittings and, like the turnstile, are fed with co-axial cable, terminating on an Antennae Patch Panel in the Control Room.

BUILDING

The main building is divided into three sections. The section immediately inside the entrance has the library, kitchen and dining facilities and is furnished with modern chromed steel framed chairs and tables.

The second section contains five operating positions for h.f. and v.h.f. bands and are being fitted out for general use by Members, also multi-



★

Looking through the control room doorway at the two AT14 350-watt h.f. transmitters.

★

★

Not shown on the left is a BC610E 500-watt h.f. transmitter. To the right of the AT14's is the v.h.f. transmitter rack.

★

band call-backs after Divisional Broadcasts and W.I.C.E.N. activities, when a number of channels are operated simultaneously.

The transmitters, together with their modulators and power supplies, will be mounted in standard 6 ft. racks, while the reeeivers and operating controls will be mounted on the operating desks.

The third section is partitioned off from the other sections by double glass and accoustic wall board and is the VK2WI Control Room. The walls are draped from ceiling to floor with green floral-patterned tapestry, with a matching floor covering.

EQUIPMENT

The equipment consists of a BC610E 500-watt plate modulated transmitter, two AT14 350-watt grid-cathode modulated transmitters for the high frequency bands, and 100-watt 144 Mc. transmitter.

The operating console has three AR7 receivers, together with operating controls for all transmitters, patching panel from audio splitting amplifiers for modulators and public address system, speakers for each receiver, microphone and tape recorder input controls.

Mounted on the rear of the console are power supplies for the receivers and audio amplifiers, together with supplies for relay-controlled circuits for the transmitters.

A standard 7 ft. rack adjacent to the operating console contains the antenna patching panel for the h.f. receivers and the v.h.f. transmitters and receivers, also the 144 Mc. and 56 Mc. converters together with their associated power supplies. Provision has been made for patching the output of v.h.f. converters to the antenna input of the AR7 receivers. A complete 5 metre receiver, which is interconnected with the relays controlling the h.f. transmitters, is mounted in this rack and is used for remote control of the VK2WI transmitters during W.I.C.E.N. exercises and broadcast relays.

Alsongside the AT14 h.f. transmitters is a 6 ft. standard rack containing the 100-watt 144 Mc. transmitter together with its power supply and class AB1 807s modulator. Provision has been made for the installation of a 56 Mc. 100-watt transmitter which is in the course of construction.

Test equipment includes a Bendix frequency meter, 5 inch cathode ray modulation checker, monitors, crystal calibrator, multimeters, modulated oscillator, and grid dip oscillators.

ACTIVITIES

The main activities connected with VK2WI are the Divisional Broadcast each Sunday morning at 11 a.m. when simultaneous transmissions are made on 7146 Kc., 3573 Kc. and 144.89 Mc., followed by transmission on 7050 Kc. for the purpose of taking reports from Members and giving information requested by those reporting in. Also the V.h.f. Broadcast each Sunday night at 7.30 p.m. on the 144 Mc. band.

Each Tuesday night at 8 p.m. a W.I.C.E.N. Exercise is carried out when Stations throughout N.S.W. discuss problems associated with emergency work and practice message handling. The frequency used is 3525 Kc.

The purchase of the property and the construction of the building has been made possible by cash donations from Members, while a very large percentage of the equipment has been donated to the Station by Members. The

Above: View of the rear of the main building where the control room is. The open window is one shown on left of the kitchen view.

Left: Interior view showing kitchen corner and on left the partition and doorway to the VK2WI control room.

work involved in modifying and rebuilding equipment, together with the major portion of the construction of the building, has been carried out by Members on an entirely voluntary basis.

This is VK2WI as it is at the present time, the accompanying pictures show various sections of the station and the installations. With these facilities already available and the continued interest by Members, there seems little doubt that progress will continue to be made.

The surrounding grounds are ideal for the holding of Conventions and similar Divisional activities and provide an excellent place for Members to bring families and friends for a picnic in the bush, or a location where country Members or Members of other Divisions touring by caravan could visit during their way through Sydney.

Visitors are always welcome at VK2WI and arrangements can be made for overseas Amateurs to inspect the Station at times most convenient to them. The Station is open all day each Sunday and generally Tuesday evenings. A phone call to Dural 289 will ascertain if anyone is in attendance.

Members of the VK2 Division are proud of VK2WI and its place in Amateur Radio activities.

New South Wales Division,
Wireless Institute of Australia,
Box 1734, G.P.O., Sydney.

THE NEW SOUTH WALES DIVISION, W.I.A.

The New South Wales Division of the Wireless Institute of Australia was incorporated as a Company in May 1922 to cover the whole of New South Wales, Australian Capital Territory, and Lord Howe Island.

The Division is governed by a Council of seven, elected annually by Members.

Within the Divisional Organisation there is the:

Hunter Branch,
V.h.f. and T.v. Group,
Central Coast Section,
Blue Mountains Section,
Short Wave Listeners' Section.
Also several Zones, the most active being the South West and North Coast Zones.

Each of these are controlled by their individually-elected Committee in liaison with the Divisional Council through one of their officers, while the Australian Capital Territory (VK1) is catered for by the Canberra Radio Society.

The objects and aims of the Division, as set out in the Memorandum and Articles of Association, is to encourage and assist all persons interested in any or all aspects of Amateur Radio and Allied Techniques.

Membership is divided into two grades:

Grade "A" ("Full Members")—Those who have obtained their Amateur Operator's Certificate of Proficiency or the Limited Amateur Operator's Certificate of Proficiency, and

Grade "B" ("Associate Members")—Those studying for their Certificates or who are interested in some aspect of Radio Science.

While Honorary Life Membership has been bestowed on those who have rendered valuable assistance to the Division or to Radio Science.

Services which are available to Members are:

- Divisional Broadcast each Sunday from VK2WI at 11 a.m. on 7146 Kc., 3573 Kc., and 144.89 Mc. Also at 7.30 p.m. on 144.89 Mc.
- **Lectures**: Divisional Meeting on the fourth Friday of each month at 7.45 p.m. in Science House, Gloucester Street, **Sydney.**

  V.h.f. and T.v. Group Meeting 8 p.m. on the first Friday of each month at the North Sydney Technical College, **Gore Hill.**

  Shortwave Listeners' Section Meeting 7.30 p.m. on the second Friday each month at the Railway Institute Rooms, Castlereagh St., **Sydney.**

  Hunter Branch Meeting second Friday each month, 8 p.m., University of Technology, **Tighs Hill.**

  Central Coast Section, Gosford, third Friday each month, 8 p.m., School of Arts, **Gosford.**

  Blue Mountains Section third Friday each month, 8 p.m., R.S.L. Hall, **Springwood.**
- Magazine "Amateur Radio" each month.
- Divisional Monthly Bulletin.
- QSL Bureau—Inward and Outward Cards.
- Procurement of Disposal Equipment for sale to Members.
- Library of current magazines, overseas publications and text books.
- Facilities at Divisional Headquarters Station, Quarry Road, **Dural.**

For those requiring Educational assistance for the A.O.C.P. examination, a lecture course of 48 lectures over a period of 24 weeks is available and is completed twice each year. For those unable to attend the lectures and may be resident in any part of the Commonwealth and Territories, there is a correspondence course covering the same syllabus as the lecture course. This course can be started at any time and rate of progress is dependent on the individual. Participation in either of these courses does not require becoming a Member of the Division.

Should it be necessary as a service to the community, in the case of emergency, and in co-operation with the State Civil Defence Organisation, Members of the Division's Wireless Institute Civil Emergency Network are participating in weekly exercises on a Statewide basis with the Divisional Station VK2WI as Central Control. Also the use of Mobile Stations in conjunction with home-based stations is being organised and further exercises planned.

During the year, apart from local functions organised by the various sections, there are six main Divisional functions:

(1) The Annual Convention held on the Australia Day week-end in January (Eighth Annual was held at VK2WI Dural on Jan. 25, 1958. Attendance was close to 250.)
(2) The North Coast Convention at Urunga at Easter.
(3) The Hunter Branch Annual Dinner and Field Day held on the Six-Hour Day week-end, in October.
(4) South-West Zone Convention, generally held on the Six-Hour Day week-end and is held in various places in the Zone.
(5) Blue Mountains Section's Field Day, late October at Katoomba.
(6) Central Coast Section at Gosford during November.

The Membership of the Division at the time of going to press was nearing the 1,000 and it is anticipated that by now that figure has been exceeded as the average monthly rate of increase from March to the end of August was 28.

Membership Fees:
Full Member, £2/2/0.
Associate Member, £1/5/0.

Full details of any of the Division's activities can be obtained from the Secretary, **Box 1734, G.P.O., Sydney.**

Members holding office in the various sections of the Divisional organisation in 1958 are listed, but there are many more who, through their efforts, both in the past and at present time, have helped to make the VK2 Division what it is today.

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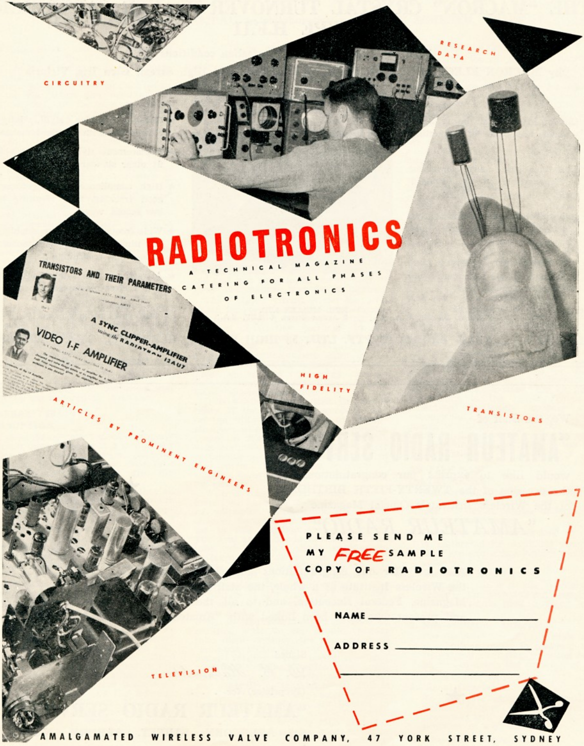
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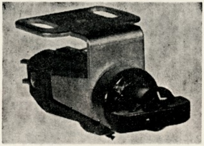

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would like to express our congratulations on the occasion of the TWENTY-FIFTH BIRTHDAY of the Wireless Institute's Official Magazine . . .

"AMATEUR RADIO"

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Also we offer our congratulations and sincere thanks to the Wireless Institute as a whole, the staff members of the Magazine, Federal Executive, and to all those both past and present who have been linked with "Amateur Radio."

Signed

D. C. Haberecht

(Proprietor) for . . .

★

"AMATEUR RADIO SERVICE"

605 ABERCORN, STREET, ALBURY, N.S.W.

Applications of the Grid Dip Oscillator*

By E. MILES BROWN, W2PAU, in collaboration with W. M. SCHERER, W2AEF

WHEN, in the course of Hamming events, it becomes necessary to seek out the cause of t.v.i., parasitic oscillations and off-frequency warnings; when that new antenna won't load the rig; when you need an r.f. signal to test out the new pre-amp.; when your home workshop special does not work the way the article said it should; when by-passes just don't by-pass—then brother, you reach for the "grid dip oscillator"! Small wonder that this simple device has won a place near the top of the list of test equipment necessary for proper operation of a Ham Station.

The fields of application of the grid dip oscillator are apparently limitless. Several articles on this subject have already appeared in periodicals and a wealth of information is available in the instruction books supplied with the commercial and amateur versions of the instrument. But, despite this thorough coverage of the subject, "CQ" still receives many requests for additional information on how to use the "dipper". It is also surprising to see how often we note a fellow Amateur struggling to get an answer to his particular r.f. measuring problem, using a grid dip oscillator under conditions where it could not possibly do a good job.

The purpose of this article is to review some of the previously published material on the use of grid dip oscillators, and to attempt to point out some of the possibilities for confusion that might be encountered in their use.

GENERAL CIRCUIT DESCRIPTION

In order to operate a device properly one must understand what it is and why it works (women drivers notwithstanding!). So let's spend a little time on the general subject of grid dip oscillator design.

It is certainly safe to assume that all grid dip meters include a tuned circuit. This usually consists of a variable capacitor and a series of plug-in coils which provide a wide-range frequency coverage. The tuning dial should be calibrated—preferably direct reading in terms of frequency. The readability and ease of dial adjustment are important design factors. The accuracy of the dial determines the potential precision of frequency measurements made with the unit. The most expensive commercial jobs are hand calibrated and can usually be relied upon to have a dial accuracy of better than ± 2%. Somewhat poorer results might be expected from a unit with a pre-calibrated dial, although the grid dip meters examined by the authors were fairly good in this respect. The accuracy of a home-made device depends on the care taken with the initial calibration and the inherent stability of the components. No instrument of this type will remain accurate under conditions of extreme abuse, so don't expect precision from a unit which has been dropped on the floor hard enough to deform the case or condenser frame, or from a coil that has been too intimate with a hot soldering iron! Lastly, keep in mind that the grid dip meter is **not** designed to be a frequency standard.

The tuned circuit section of the grid dipper may be used as a passive absorption wavemeter. This possibility is noted here because it is often convenient to use the unit without plugging it into a power source.

The tuned circuit must be used in connection with some form of oscillator. Almost any type of oscillator circuit may be used. The most popular one for this application seems to be the Colpitts, using a split-stator tuning condenser connected between the grid and plate of a triode oscillator tube. This circuit offers possibilities for good high-frequency performance, as the tube capacitances are effectively in series. It also provides reasonably uniform feedback across the tuning range. By using resistors, rather than chokes, in the grid and plate leads, the number of stray reasonances may be minimised.

The Colpitts circuit is not too well suited for very low frequency operation, but fortunately it can be converted into a form of Hartley oscillator by the addition of a coil centre tap.[1] The Colpitts has another advantage for dipper applications—both sides of the coil are "hot" with respect to ground. This implies that r.f. energy may be coupled from either end of the coil using loose capacitive coupling.

It is worthy of note that the sensitivity of the meter has some bearing on the ultimate sensitivity of the instrument when used as an r.f. voltmeter (more on this point later). In general, it is desirable to use a sensitive meter to provide good up-scale indications of grid current without the necessity of running excessive power in the oscillator circuit.

With a tuned circuit, a tube, and a meter, we have the makings of a tuned r.f. voltmeter. Fortunately, the circuit changes necessary to adapt the oscillator to this function are very minor. The grid and cathode of the oscillator tube can act as a diode rectifier, to measure the r.f. voltage developed across half the tuned circuit. This is accomplished by simply removing the plate voltage from the oscillator. The sensitivity of this type of r.f. voltmeter will depend to a certain extent on the meter used. However, there is a definite limit to the sensitivity that can be realised, since in any simple vacuum tube diode detector, the phenomena of "emission potential" produces a small meter reading even under no-signal conditions. Signals which are small compared to this "emission potential" will generally be masked by it. This is the chief reason why most conventional grid dip meters are limited in their ability to detect weak r.f. signals. Secondly, the relatively high grid-leak resistance required for good oscillator operation tends to limit the sensitivity.

SENSITIVITY CONTROLS

To enable the r.f. meter to handle a wide range of input voltages, some sort of sensitivity control is desirable. This control is also of value in setting the indication of oscillator grid circuit to a mid-scale value. (Despite the best efforts of expert designers there is bound to be some variation of activity across any given tuning range, with the oscillator usually becoming least ambitious on the higher frequency ranges.) A variable resistor, connected as a shunt across the d.c. meter, or as a multiplier in series with it, will serve the purpose. This type of control reduces the meter sensitivity.

Given the basic tuned-circuit/r.f. voltmeter/oscillator combination described above, certain refinements practically suggest themselves. If we're going to use the unit as an r.f. detector, it might be nice to arrange a system for plugging a pair of headphones into the detector circuit to provide a means of listening to the signal being detected. This converts our instrument into a passable phone transmitter monitor. If the headphones are left in the circuit when it is switched to the oscillating condition, we have the equivalent of a regenerative receiver, which can be used for monitoring the frequency and tone of c.w. signals.

Since the oscillator generates an r.f. signal which may be used for testing receivers, etc., it might be desirable to provide some system for applying modulation to the signal. Though a modulated oscillator probably won't produce the highest quality type of a.m. signal, it still might be useful for tests involving the receiver audio system, or for detecting and identifying the grid dipper signal.

AS FIVE BASIC INSTRUMENTS

Summarising the material outlined above, we have shown that the grid dipper is a device capable of serving as five basic instruments:

1. **Grid Dip Oscillator (g.d.o.)**
   A calibrated r.f. oscillator equipped with a meter indicating the oscillator activity.
2. **Oscillating Detector**
   Equivalent to a simple regenerative receiver for detecting r.f. signals by the heterodyne method using headphones.
3. **Non-oscillating Detector**
   For the detection of r.f. signals using the built-in meter to measure relative signal strengths, or using headphones to detect the presence of a.m. on the signal.
4. **Signal Generator**
   To generate strong r.f. signals of known frequency. Modulation, if provided, will probably be a combination of a.m. and f.m.
5. **Absorption Wavemeter**
   A passive calibrated tuned wavemeter.

---

* Reprinted from "CQ", January 1953.

1 "Extending the Range of the Grid-Dipper," Scherer, "CQ", April 1950.

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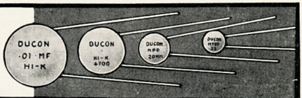
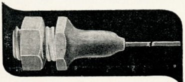
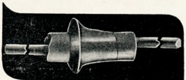
The disc ceramic, with its short rf current path, when soldered direct to the tube terminals, reduces the inductance to very small values.





TYPE CAE — Screw mounting stand-off variety in capacity ranges of 100 pf. min. to 3000 pf. max.



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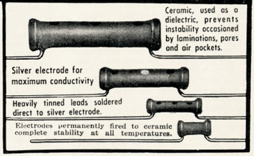
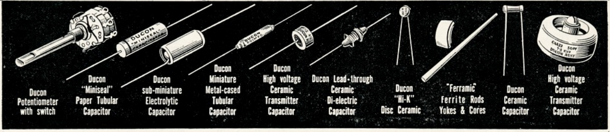
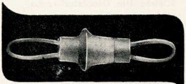
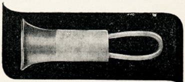






TYPE CAC — Feed-thru flange mounting type can be soldered direct to the chassis or shield plate in tuner units. From 50 pf. min. to 1500 pf. max.



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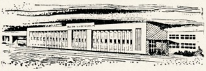

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THE GRID-DIP FEATURE

Let's first consider the possibilities of the unit operated as a grid dip oscillator. When an oscillator is coupled to a circuit which is capable of taking r.f. power from the oscillator, its activity will decrease. This is analogous to the situation encountered in a transmitter output stage—when an antenna is coupled to the transmitter and starts to draw power from it, the amount of r.f. voltage floating around in the final tank is reduced. Obviously, if the load circuit is tuned, it will accept power more readily at the particular frequency where it is resonant. If the grid dip oscillator is coupled to a non-resonant type of load (such as a low inductance link feeding a pure resistance) power will be accepted by the load over a wide range of frequencies, and the effect on the oscillator will be a general reduction of grid current regardless of the oscillator dial setting. It may be virtually impossible to detect resonant effects in a circuit of this nature. If, on the other hand, the oscillator is coupled to a low-loss parallel-tuned L/C circuit, power will be absorbed most efficiently at the resonant frequency of the load circuit, and a well-defined dip in the oscillator grid current will be noted as the oscillator is tuned across this frequency. The higher the "Q" of the coupled circuit, the sharper the dip.

Any electrical circuit which displays resonance effects may be investigated using the grid dipper. Parallel-tuned L/C circuits, sections of r.f. transmission lines, quartz crystals, antenna elements, filter sections, r.f. choke coils (with distributed capacity), r.f. by-pass capacitors (with lead inductance), stray resonant circuits formed by long wiring leads and their associated stray capacitances . . . the list is probably endless. Before attempting to use the grid dip oscillator to check the resonant frequency of any electrical system, it's quite important to figure out in advance just what sort of circuit is involved. Unless one can visualise the nature of the resonant circuit, it is difficult to determine how to couple the power output of the grid dipper into it.

SINGLE TUNED CIRCUITS

Let's take a simple example—a parallel-tuned circuit consisting of a coil and its tuning capacitor. In practice, this arrangement is frequently encountered in oscillators, transmitter interstage and output tank circuits, wavetrap circuits, v.h.f. receiver front ends, antenna tuners, etc. From experience with transmitter circuits, most of us know how such a circuit behaves when power is fed into it at its resonant frequency. If one end of the coil is grounded, high r.f. voltages appear on the other end. If the coil has a centre tap and this is grounded, both ends of the coil become hot with respect to ground. Most of us are also familiar with the means used to transfer power from one tuned circuit (the g.d.o. coil) into another (the circuit under test). If we can get the driver coil close enough to the driven coil we can provide mutual-inductance coupling between the coils. Tightest coupling will exist when the driving coil is actually placed inside the driven coil, with the coil axes parallel. Some degree of

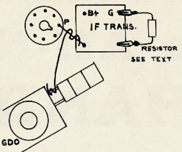

Fig. 1.—Method of checking the resonant frequency of a double-tuned shielded i.f. transformer. Note the clipped-in resistor across the other winding of the transformer, and the use of a short piece of hook-up wire wrapped around the coil prong of the grid dipper, which provides coupling into the shielded circuit.

coupling may be obtained by placing the coils side-by-side, with their axes parallel. And that's the logical way to approach a simple single-tuned circuit with the grid dip oscillator.

However, suppose the coil is inside a shield can, or is so arranged that we can't move in close enough to it with the dipper coil? Well, what do we do in a transmitter in order to get power from a driver stage into the following grid coil when we can't arrange the layout so the coils are close together? One way out is to use capacitive coupling. Since both the grid dipper tank circuit and the circuit under test are high-impedance circuits (at resonance), the amount of coupling capacitance required to transfer power between the hot ends of the coils may be very small.

Occasionally, adequate capacitive coupling may be obtained by bringing the end turn of the dipper coil, or one of the coil plug leads, close to a hot lead on the tuned circuit under test. If this is not sufficient, a little extra capacitance may be added in the form of a "gimmick" (Fig. 1), made by wrapping one end of a short length of insulated hook-up wire around one of the coil prongs of the dipper, and the other end around one of the hot leads on the tank circuit under test. The loosest possible coupling should be employed, since the added stray capacitance on the grid dipper coil will tend to upset its dial calibration. The wire should be insulated at **both** ends—it merely provides a small amount of coupling capacitance and an extension lead between the dipper and the circuit under test.

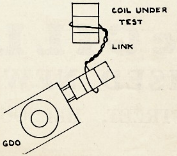

Fig. 2.—Coupling by means of a short link.

Another means of transferring power between two widely-separated tuned circuits is by link coupling (Fig. 2) and this system may also be used with the grid dipper. In fact, some commercial models of the dipper are furnished complete with a small link-coupling device. In general, the links should be small, and exhibit as little self-inductance as possible, in order to avoid resonance effects in the links themselves. The transmission line between the links should be short, for the same reason.

It often happens that the parallel-tuned circuit under investigation is not composed of a single coil and compact capacitor, but rather consists of stray-type reactive elements. For example, we often employ r.f. choke coils to serve as blocking devices to prevent r.f. currents from flowing into a circuit. It is desirable to have an r.f. choke look like a very high impedance at the frequency it is supposed to block. The highest impedance obtainable in an r.f. choke occurs when it looks as if it were a parallel-resonant circuit. Resonance effects are present because the distributed capacitance between coil turns acts like a tuning capacitor across the coil winding.

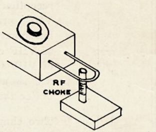

Fig. 3.—This is the method of determining the natural resonant frequency of a common v.h.f. r.f. choke coil. In this case, the choke is acting as a parallel-tuned circuit, in which the capacitance is formed by the stray capacitances between the individual turns of the coil. Note that both ends of the choke coil should be insulated from ground and dressed away from grounded objects.

We can therefore treat the r.f. choke like a combination of inductance and capacitance, and "dip" it just like any other tuned circuit. In Fig. 3, which illustrates this application of the dipper, mutual inductance coupling is employed, and both terminals of the choke coil are insulated from ground. Multiple-winding chokes may display more than one resonance.

The converse of the case just described might be a capacitor with distributed inductance in its leads or internal structure. In an r.f. by-pass circuit we generally desire the lowest possible impedance from the by-passed point to ground. At low frequencies, most capacitors look and act like capacitors—the effects of lead lengths, etc., are neglible. But at very high frequencies, the inductive effects are noticeable, and the impedance of the by-pass actually rises with increasing frequency. It is often handy to know at what frequency the inductive and capacitive effects tend to cancel out and produce the best by-passing action. This can be checked by connecting the ends of the capacitor leads together to form a one-turn loop, which can be treated as a simple parallel-tuned cir-

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cuit. The dipper can then be inductively coupled to the single turn loop (Fig. 4).

The resonant frequency as determined by this method is actually the frequency of best by-passing action, but it should be remembered that at frequencies above the resonant point the capacitor acts more like an r.f. choke! The approximate resonant frequency depends so much on the type of capacitor being choked that it is impossible to estimate the frequency range in which you should start looking; typical paper-roll type units may resonate in the low megacycles, micas may go up into the hundred megacycle or so range, and some of the tiny ceramic units now available will probably resonate beyond the range of most Ham dippers!

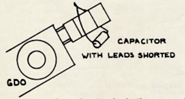

Fig. 4.—Using the g.d.o. to check the resonant frequency of a paper tubular capacitor with the leads short-circuited. The dip may be hard to find on some units because of their high Q at resonance.

Even the simplest single-tuned circuit displays "parasitic" resonances. The coil, as we have pointed out, has distributed capacitance between its turns. The leads to the tuning condenser and the frame of the condenser have inductance. Thus, in addition to its main, low-frequency resonance, the circuit will exhibit additional resonances where the v.h.f. effects come into play. Such resonances are often a serious problem in high-powered transmitter circuits where the components are necessarily large. Coupling the grid dipper to these "invisible" resonant circuits is a problem that requires the use of good judgment and common sense, because it is next to impossible to predict just where the "coil" section of the parasitic resonance is located and where the "condenser" is! In fact, these circuits quite often do not take the form of "coils" and "condensers" but rather are more similar to transmission lines; a condition which merits a separate discussion.

To best approach such a set-up, couple the grid dipper coil as closely as possible to the wiring loop formed by the leads between the coil and the capacitor. In the case of a transmitter, the "capacitor" might well consist of the tube capacitances and not the big variable! After a little experience you'll be able to judge quite accurately where the long leads will resonate, and where the "hot spots" of the parasitic circuit are located. There's no set rule. We can't even say that the plates of the tubes are "hot" at the v.h.f. resonant frequency because of the long leads inside the tube. Fig. 5 shows a typical approach. We were able to couple sufficient energy by placing the dipper coil close to one plate lead, which probably gave a combination of inductive and capacitive coupling. Here's a good point to remember: when such a situation as this exists, it is often possible to increase the coupling by reversing the position of the coil in the grid dipper—it may produce addition, not cancellation, of the two modes of coupling.

It's wise to spend a little time after you build a new rig searching out the various stray resonances. It pays off. The unit had a strong resonance right in the middle of t.v. channel 7. It would have been a durned sight easier to make minor changes in the wiring layout to QSY that peak to a less occupied frequency than it would be to shield the entire transmitter to the extent that would prevent radiation of the strong channel 7 harmonic! By luck, however, the grid circuit of this particular rig resonated on a different frequency. If it had resonated on channel 7 also, think of how difficult it would have been to clean up that tendency of v.h.f. oscillations.[2] Similar remarks apply to receiver circuits. It took a grid dipper to locate the stray resonance in an r.f. choke used in the plate circuit of our two-metre r.f. amplifier which was causing said r.f. stage to pass along more noise at the i.f. of 7 Mc. than signals at 144 Mc.!

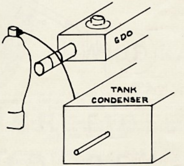

Fig. 5.—Checking the frequency of a stray resonant circuit formed by the leads between the plate cap and the associated circuit elements in a medium power transmitter. The coupling in this case is probably a combination of inductive coupling to the loop formed by the leads, and capacitive coupling between the dipper coil leads and the plate cap of the tube. It was no surprise to find it resonating in the middle of t.v. channel 7!

Before leaving the subject of single-tuned circuits, a few practical operational tips are in order. Generally, when attempting to "dip" circuits associated with tubes, the **filaments** as well as the plates should be off. This is due to the fact that the grid and cathode of any tube act as a diode. This diode, connected across a tuned grid circuit, can so "de-Q" the circuit that the dip on the g.d.o. meter may be broadened beyond the point of recognition. Another illustration of this problem is the input coil of a grounded grid r.f. stage. Under normal operating conditions the coil acts as if it is loaded by a parallel resistance of about 100 ohms! It's vitally important, however, for proper performance of the stage, that it be tuned to resonance.

Antenna coupling circuits (in transmitters and receivers) should be checked without the antenna connected, at first, since the antenna will load the coil and may introduce spurious resonance effects. At the higher frequencies, when the antenna is disconnected, the coil will most likely be detuned because of stray reactances in the antenna connector system. We usually pull out the input link or un-solder the tap on the input coil to be on the safe side.

When working in the close confines of modern miniaturised chassis, it may be hard to tell whether the grid dipper is actually coupled to the desired tuned circuit or to some other circuit resonant near the same frequency. The quickest way to check this point is to de-tune the desired circuit slightly, using its trimmer, or by touching a "hot" section of said circuit with the tip of a wooden lead pencil. (We've found that a "subtle" de-tuning of this nature is more indicative of resonance on the v.h.f. bands than the "brute force" method of shorting the coil with a metal screwdriver or the like. Admittedly, more drastic de-tuning than the pencil provides may be required on low-Q low-frequency circuits!) This sort of test probing may also furnish interesting information on the distribution of r.f. voltages around the circuit. The "hotter" the point of contact of the pencil tip, the more noticeable the reaction of the grid dip meter.

TRANSMISSION LINES

In some ways, transmission lines act like simple tuned circuits. Consider a length of transmission line with one end open-circuited and the other short-circuited. At some frequency this line will appear to be quarter-wavelength long. If power is coupled into the transmission line at this frequency, the line will behave like a simple parallel-tuned circuit. A high r.f. voltage will appear across the open-circuited end, and high current will flow through the short circuit.

Knowing the physical length of a transmission line and the "velocity of propagation" factor for that type of line (obtainable from the handbooks or the manufacturer's catalogues), we can calculate the frequency at which the line will be a quarter-wavelength long. On the other hand, knowing the resonant frequency (which we can easily measure with the grid dipper) we can determine the effective length. A full wavelength in space (expressed in metres) is equal to 300 divided by the frequency in megacycles. To convert metres to inches, multiply by 39.4. The wavelength in a transmission line is less than the wavelength in free space, so to get the length of transmission line equivalent to a wavelength in air so we simply multiply the wavelength in air by the "VP" of the line; which may run around 0.66 for flexible co-axial line, around 0.80 for twin lines, about 0.99 for open-wire lines, etc.

The grid dipper can be coupled to a shorted section of transmission line by considering the shorting jumper as a low inductance link, and coupling the dipper to it. In the case of co-axial cable, it may be necessary to form a small loop of the inner conductor outside the shield when short-circuiting the line, to provide a link to couple into. If it's impossible to get at the shorted end of the line, measurements may be made at the open end, by using capacitive coupling techniques as described

[2] Orr, "The Pursuit and Elimination of Parasites", "CQ", Dec. 1950. This is a must for the transmitter designer!

for simple tuned circuits. This method is disadvantageous in that the added capacitance de-tunes the transmission line as well as the g.d.o.

A transmission line which is not short-circuited at either end can resonate as a half-wavelength section. To check this mode of resonance, we should couple to the centre of the line, though it may be difficult to obtain enough coupling. Try reversing the coil, if at first the dip is not sufficient. Obviously, in the case of co-axial lines at half-wavelength resonance, we cannot couple in the centre, so we must couple on an end, using capacitive coupling techniques.

Everything that was said above with regard to quarter-wave line sections also applies to ¾, 5/4 and any **odd** number of quarter-wavelength sections. In addition, everything that was said about half-wavelength lines also applies to full-wavelength, 1½ wavelengths etc. lines. Thus, it is necessary to do a little preliminary calculation to estimate in what general frequency range the line under test will act as a quarter-wavelength line, or what have you. If the physical length of a section of line is not known, a link can be hooked across one end, the other left open, and a series of checks made to check the various odd-quarter-wave resonances. From these readings the fundamental resonance can be found.

For example, suppose we had a roll of RG-8/U (52 ohm), and wanted to determine its length (Fig. 6). Coupling the grid dipper into a short-circuit on one end (better use an ohm-meter to see if the other end is open circuited!) we might find dips at 22.9, 16.3 and 9.8 Mc. Looking for a common denominator in this series, we note that 9.8/3 equals 16.3/5 and 22.9/7 or 3.25 Mc. A dip would be located at 3.25 Mc. also, if we had looked there. So the line is effectively quarter-wavelength long at 3.25 Mc. or 92 metres. Electrically, it would be a full wavelength at 23 metres. Allowing 66% for the velocity of propagation, the line is then 23 × 0.66 or 15.2 metres physical length (600 inches). This example also serves to illustrate the numerous modes of resonance that may be encountered when using a non-terminated length of transmission line. Little wonder that they sometimes lead to confusing results in antenna measurements!

Obviously, all these remarks on transmission lines apply only to sections of lines which are actually open or short circuited—if a line is connected to a load such as an antenna, all bets are off! If it is desired to check a line when it is connected to a load on its far end, arrange to short-circuit the load end, and use capacitive coupling methods on the "sending" end. Be sure to use low-inductance leads to accomplish the short-circuiting, otherwise stray inductance in the shorting lead may upset the readings.

COUPLED TUNED CIRCUITS

When tuned circuits are coupled together, the problem of determining the resonant frequency of an individual section of the combination is somewhat complicated. One approach is to separate the circuit under test physically and electrically from the other sections of the network. This is often easy to do in the constructional phases of a job, but once the job is finished it may be impracticable. For example, in constructing a t.v.i. filter, one might take the trouble to pre-align the individual series-tuned and parallel-tuned traps which make up the filter to the desired rejection frequencies before combining the sections in the final arrangement. (Series-tuned traps, incidentally, can be short-circuited and treated as parallel-tuned circuits.) After assembly of the unit, it is extremely difficult to adjust to the proper trap resonances because in a typical filter all adjustments interact.

It must be admitted that the pre-alignment method described above is not fool-proof. Often the slight changes in tuning which may be involved in moving the components to their final location are too important to neglect. One of the best puzzles we've run into is how to line up the coils of a Wallman cascode r.f. amplifier for v.h.f. use. Essentially, this circuit has three parallel-tuned circuits, wired in series with each other. The capacitors of the parallel-tuned sections usually consist of tube capacitances only. It's well-nigh impossible to separate the components of this circuit for alignment

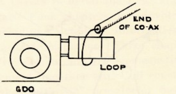

Fig. 6.—This is how the g.d.o. is used to check the resonant frequency of a section of co-axial transmission line open-circuited on one end and short-circuited on the other. This line, about nine feet long, resonated at 19 Mc. The dip will be quite sharp due to the relatively high Q of the line.

with a g.d.o., which simply means that we're still using the old cut-and-try design methods on this circuit! Neither is it practical to separate the primary and secondary windings of a typical r.f. or i.f. transformer; their tuning adjustments interact. The safest procedure in this case is to swamp out the Q of the unused winding by clipping a loading resistor (in the order of about 10,000 ohms) across it. This will also drop the Q of the coil under test but by judicious selection of the value of loading resistance it should be possible to retain resonable sharpness of dip and still minimise the effects of tuning of the loaded coil.

We might refer back to the paragraph where we mentioned the method of checking for resonance effects, using a lead pencil or the like as a test probe. This method is also valuable whenever coupled tuned circuits are being checked. And don't forget that often it is not obvious that two circuits are coupled—for example, the tuned circuit in the signal input grid of a receiver mixer tube is often coupled (accidentally or deliberately) to the oscillator tuned circuit.

And the antenna feed line is usually coupled to a resonant antenna . . .

ANTENNAE

Much has been said about the use of the grid dip oscillator to tune antennae. It is true that the natural resonant frequencies of a radiating wire can be determined quite nicely with a grid dipper by treating it in much the same fashion as the transmission lines described above. But when we hear a Ham talking about the way he pre-tuned his close-spaced five-element Yagi array using only a grid dipper, we wonder just how the design was accomplished. Coupled antenna elements are as hard to deal with as coupled tuned circuits. Take an element out of an array and both the element and the array are de-tuned. Even if it were possible to check the individual element resonant points, how would one be sure just what significance this data might have in calculating the directional pattern or feed impedance of his beam antenna? In short, it is the opinion of these writers that grid dip oscillators may be used effectively to test single-element antennae (straight or folded dipoles, ground planes, mobile whips, etc.), but it is extremely difficult to obtain useful data on a beam array with the unaided g.d.o.

Before attempting to test an antenna with the g.d.o., stop to figure out the current and voltage distribution of the antenna. If it is a centre-fed straight dipole, on its fundamental frequency it will be current-fed, and the feed point should be shorted for the test. On the second harmonic frequency the same antenna will be voltage-fed, and to test the array on this band the feeders should be removed and the two sections of the antenna treated separately. A ground plane antenna or a resonant mobile whip is usually fed at a low-impedance point, so the feed point should be shorted. An end-fed Zepp antenna is a tough one to describe because the feed line is actually part of the radiating system. About the safest statement to make here is that precise tuning of the antenna itself or the feed line itself is not generally required in a system of this type. By tuning the feeder reactance at the sending end,

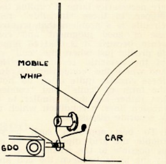

Fig. 7.—This is a popular method of checking the resonant frequency of a mobile antenna. Note that the feeder has been removed (inside the base insulator) and a low-inductance link coil substituted across the base.

with an antenna tuner, one can make the antenna take power, and if there's enough wire up in the air, it will radiate!

To couple the g.d.o. into an antenna: If coupling at a high voltage point use the methods of capacitive coupling described earlier. To couple at a current feed point, the feed line should be **removed** and a shorting jumper installed in its place. (The line must be removed, otherwise it will represent a resonant system loosely coupled into

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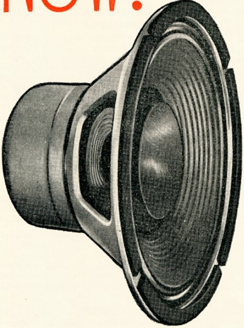

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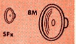

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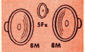

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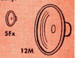

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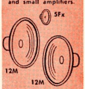

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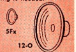

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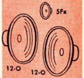

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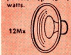
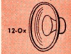
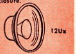


An excellent coaxial-type single speaker for radiogram use with small amplifiers.



Similar to the 12Mx but with an extended frequency range and better power handling capacity. Works best in a vented enclosure.



Irrespective of price, the Hi Fi Model 12Ux is without doubt the finest loudspeaker available. Although it gives best results in a properly dimensioned vented enclosure, it performs brilliantly in a standard open-backed radiogram cabinet and will handle up to 20 watts of power.

the antenna because of the fact that the short-circuiting jumper has a finite impedance and allows the feed line to absorb energy at the frequencies where it resonates.) Then the dipper can be coupled into the jumper to check the various modes of resonance of the antenna. In order to provide an easy means of coupling to the jumper, it may be formed into a one-turn link coil (Fig. 7). The length of the wire in the jumper should be very short comnared to the length of the antenna, despite this coiling.

When coupling into a high-current point of an antenna element with no split at the feed point (this test would be merely of academic interest, because addition of a feeding system would undoubtedly de-tune the element), it may be possible to obtain sufficient coupling by placing the g.d.o. coil as close as possible to the antenna element. Since this system provides a combination of capacitive and inductive coupling it would be well to try reversing the position of the coil in the grid dipper for best coupling. Another stunt is that of clipping a test lead across a short length of the element at its centre and coupling into this clip lead.

QUARTZ CRYSTALS

If a quartz crystal is connected into the coil terminals of any of the popular Colpitts-type g.d.o. circuits (Fig. 8) the g.d.o. becomes a Pierce-type crystal oscillator. The crystal will oscillate on its fundamental frequency in most cases. (Most crystals up to about 10 Mc. are fundamental cuts. Above this frequency they are likely to be third or fifth overtone units.)

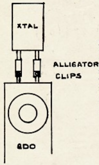


Fig. 8.—Using the grid dip oscillator circuit as a crystal oscillator to check the activity of a fundamental frequency crystal. In this arrangement the dipper circuit becomes a Pierce oscillator. The tuning capacitor should be set at or near minimum capacitance.

The activity of the crystal will vary as the tuning capacitor of the g.d.o. is rotated; peak activity will occur at a point near minimum capacitance setting. The meter of the grid dipper gives an indication of relative activity of various crystals. While the crystal is oscillating in the dipper circuit its frequency can be checked on a calibrated receiver or frequency standard. It should be noted, however, that the operating frequency of a crystal depends greatly on the constants of the circuit in which it is used. In fact, it will be apparent that the tuning dial of the g.d.o. affects the frequency of the crystal signal considerably.

To check the activity of overtone crystals: Energy may be coupled into a crystal from the dipper coil by connecting across the crystal terminals (Fig. 9). At the frequency where the crystal looks like a series-resonant circuit it will produce a very sharp dip, and the relative strength of overtone modes may be judged by the amount of the dip.[3]

MEASUREMENT OF CAPACITANCE AND INDUCTANCE

The grid dip oscillator can be used to measure the resonant frequency of a capacitor and inductor. If we know either the inductance or the capacitance in a tuned circuit, knowing the frequency we can calculate the unknown element with a fair degree of accuracy, using the simple resonance formula. Most manufacturers of commercial grid dip oscillators provide figures on the actual inductance of the coils for their units, so the unused coils of a set may be used as inductance standards. It is not hard to build up a collection of accurate capacitance standards. A small variable capacitor calibrated directly in micro-micro-farads is also a handy grid dipper accessory. Certain commercial coils (such as the B. & W. Miniductor line) are sufficiently consistent in production that the manufacturer rates the coil in microhenries per inch. The scientifically-inclined Ham should make an effort to acquire suitable standards of inductance and capacitance for use in conjunction with his grid dipper; it's easy to measure effective r.f. reactances by this technique, though extremely difficult by most other systems available to the Ham.

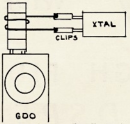


Fig. 9.—We can also use the dipper to check the activity of a crystal on its overtone mode. In the case illustrated, the grid dipper showed that the 8 Mc. crystal also displayed a strong series-resonant effect at 24 Mc.

OTHER FUNCTIONS OF THE GRID DIP OSCILLATOR

Here we are, almost out of space, and we haven't mentioned the other important applications of the grid dip oscillator. This is probably due to the fact that the grid-dip function is so unique to this type of instrument that this particular application is not as widely understood as the others. After all, we've had absorption wavemeters, test oscillators, oscillating c.w. monitors, etc., in our Ham shacks for years, so we'll kinda skip over these points hurriedly.

OSCILLATING DETECTOR

Using the grid dipper as a simple regenerative receiver gives us the most senstive means of detecting the presence of weak unmodulated r.f. signals. It also provides information on the approximate stability and tone of the signal being received. About the only elaboration necessary here is to caution the reader that he should check the circuit of his particular grid dipper to see whether it is suitable for his type of headphones. Some circuits require that a resistor be added in parallel with crystal headphones to provide a d.c. return. Other circuits might connect the phones in the B-plus lead, which would be bad for crystal phones. Also keep in mind that the headphones are connected to **your** head when you're probing around in the innards of a transmitter! **Be careful!**

NON-OSCILLATING DETECTOR OR MONITOR

The dipper may be used as a tuned r.f. voltmeter to detect the presence and approximate magnitude of a signal applied to the dipper's tuned circuit. Every remark which was made relative to coupling power from the dipper into an external tuned circuit applies equally well to the situation in which it is desired to couple power from an external circuit into the grid dipper coil. Numerous applications of this feature will present themselves—the dipper may be used as a field-strength meter obtaining its signal from a small pick-up antenna. It can be used to check the activity and frequency of oscillators in transmitters and receivers. It can be used to search for spurious output signals from a transmitter.

Though the typical grid dip oscillator is not sufficiently sensitive to detect signals capable of causing t.v.i. in the fringe area, it is a valuable tool in tracking down obvious causes of t.v.i. and during the preliminary cleaning-up processes.

Don't expect to have 100% success in "sniffing" out a micro-watt size signal in the output stages of a kilowatt rig, either. After all, the grid dipper has only one tuned circuit in it, and a single circuit does not provide enough selectivity to permit it to read a very weak signal in the presence of a very strong one even though the frequencies may be quite widely separated. If, in searching for a meter reading on a harmonic frequency of the big rig, you notice an up-scale reading on the dipper meter which seems to be relatively unaffected by tuning, it's probably normal, and due to overloading by the main output signal. This effect may mask the weak signal you're looking for. In spite of this tendency, however, it's surprising how well the dipper shows up spurious off-band signals.

Another point to watch out for in using the dipper as a field strength meter—make certain that the signal shown on the meter is the one you want to read. If the dipper is close to the transmitter it may be receiving most of its input signal via the power lines, or by radiation from the output circuits of the transmitter, rather than from the antenna system. For similar reasons, we have had little luck in attempting to use the dipper to check for standing waves on open-wire antenna transmission lines. It is also extremely difficult to arrange pure inductive coupling (or pure capacitive coupling) to the transmission line, therefore the standing wave pattern measured is likely to be a combination of the r.f. voltage standing wave pattern and current standing wave pattern—not much use for accurate work.

(Continued on Page 46)

3 Simms, "Checking Crystals for Overtone Activity", "QST", Sept. 1951.

IAN NICHOLS, VK7ZZ

Block by courtesy of Hobart "Mercury."

THOSE Amateurs frequenting the c.w. portion of the 7 Mc. band recently have probably heard VK7ZZ, Ian Nichols, 9 Cressy Street, New Town, Tasmania. Ian obtained his A.O.C.P. just in time for the Remembrance Day Contest and wasted no time in getting on the air. Nothing remarkable in that perhaps, except that he is totally blind.

Blinded in an accident at the age of six, he attended High School and University where he obtained his B.A. and Ll.B. degrees. Although he has been interested in Radio for a number of years, these studies, and later family responsibilities (he has four children) left no time for swotting for his Ham ticket. When the time came Braille copies of the Admiralty Handbook and the A.R.R.L. Handbook were obtained, and early in August an oral examinatino, conducted by the P.M.G. Department, was successfully passed. The Morse test was taken down in Braille and typed from that by Ian himself. He is now employed in the accounts section and in legal work for the Electrolytic Zinc Co.

For the present he is limited to an input of 10 watts crystal controlled, his transmitter to be built, installed and maintained by sighted Amateurs for which VK7BJ. VK7KA and VK7OM have made themselves responsible. The transmitter when completed will have provision for four crystal frequencies in the 7, 14 and 21 Mc. bands with an aural tune-up device. The modulator to come later will be built by Ian himself. A special Avo meter for use by the blind is a recent acquisition.

The photograph shows VK77 operating in the R.D. Contest while his eight-year-old son, Robert, looks on. The receiver is a SX16 and on top of this is the transmitter, then being used, a portable/mobile 8 watt rig loaned by VK7CH.

— . . . —

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Please note that magazines should be addressed as shown above, and not taken, or sent, to the Institute rooms or to the monthly meetings.

— . . . —

BOOK REVIEW

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By F. M. Colebrook

This book will take the student of our very diverse subject through from elementary algebra to differential and integral calculus and also includes special chapters on mathematics applied to radio and other special techniques.

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Model 12 3/16" (Push-on)	6, 12, 24-27½	12	0.5 oz.	6.25"	Radio, Television, and Telecommunications assemblies.
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MSP3.58

Rules: 1958 "CQ" World-Wide DX Contest

i.—Contest Period

Phone section—0200 GMT, October 25 to 0200 GMT, October 27.

C.w. Section—0200 GMT, November 29 to 0200 GMT December 1.

ii.—Bands

The contest activity will be in the 1.8, 3.5, 7, 14, 21, 27, and 28 Mc. Amateur bands.

iii.—Type of Competition

1. Phone Section: (a) Single Operator, (b) Multi-operator.
2. C.w. Section: (a) Single Operator, (b) Multi-operator, (c) Novice Operator.
3. Inter-club.

iv.—Equipment

There is no limit to the number of transmitters and receivers allowed, and competitors may use the maximum power permitted under the terms of their license.

v.—Serial Numbers

Phone stations will exchange serial numbers consisting of four numerals, the first two being the RS report, and the last two being their own Zone number. C.w. stations will exchange serial numbers consisting of five numerals, the first three being the RST report, and the last two being their own Zone number.

Stations in zones 1 through 9 will prefix their Zone number with zero (01 and etc.).

vi.—Points

Contacts between stations on different continents will count 3 points. Contacts between stations in the same continent, but not in the same country will count 1 point.

Contacts between stations in the same country will be permitted for the purpose of obtaining a Zone and/or country multiplier, but no QSO points are credited. More than one contact between stations on each band will not be permitted.

vii.—Multiplier

Two types of multipliers will be used.

(a) A multiplier of 1 for each Zone contacted on each band.

(b) A multiplier of 1 for each Country worked on each band.

viii.—Scoring

1. The score for each Single Band is the sum of the Zone and Country multiplier for that band, multiplied by the total contact points on that band.

2. The total All Band score is the sum of the Zone and Country multipliers of all bands, multiplied by the sum of the contact points on all bands.

3. Everyone who sends in a log for a single band is eligible for a Single Band award only. If a log is submitted for more than one band, indicate which band is to be judged, otherwise it will be judged as an All Band entry.

4. Those who submit a log for two or more bands will be judged for the All Band award.

5. A station is not eligible for more than one award.

6. Single operator contestants must show a minimum of 12 hours of operating time to be eligible for an award. If a contestant operates all bands and wishes to be judged for a specific single band, he must show a minimum of 12 hours on that band.

7. Multi-operator stations must show a minimum of 24 hours of operating time to be eligible for an award.

ix.—Zones and Countries

To check your own Zone number and country for scoring purposes, refer to the A.R.R.L. or "CQ" list as well as the W.A.Z. map. The continental boundaries used for W.A.C. will be recognised. Should any question arise as to the positive location of a station, the official definition will be final.

x.—Awards

Certificates will be awarded in each sections as follows:

1. To the highest scoring station on each Single Band in the following areas: (a) Each call area of the U.S.A.; (b) Each call area of Australia and Canada; (c) All other countries.

2. To the station having the highest All Band score (more than one band) in the following areas: (a) Each call area of the U.S.A.; (b) Each call area of Australia and Canada; (c) All other countries.

xi.—Special Awards

1. A cup will be awarded to the highest scoring Single Operator, All Band, Phone Station in the world. (Donated by W2SKE.)

2. A cup will be awarded to the highest scoring Single Operator, All Band, C.w. Station in the world. (Donated by W2IOP.)

3. A cup will be awarded to the highest scoring Multi-operator, All Band, Phone Station in the world. (Donated by K2AAA.)

4. A cup will be awarded to the highest scoring Multi-operator, All Band, C.w. Station in the world. (Donated by K2GL.)

5. A plaque will be awarded to the affiliated DX Club submitting the highest aggregate score of the scores submitted by its members. (Donated by "CQ".)

6. At the request of the donors, previous winners are not eligible for the 1958 awards. In other words the cups cannot be won more than once by the same station. This, however, does not apply to the plaque award.

7. Also such special or additional awards as the Committee shall choose to make. In countries or sections where the returns justify, second and even third place certificates may be awarded.

xii.—Operating Suggestions

1. Foreign Amateurs, remember, scores are based on the greatest number of Countries and Zones as well as stations worked. Therefore do not concentrate on working only U.S. stations. This is a world-wide competition.

2. DX Stations; it is recommended that you give the call of the station you are working at the end of each transmission. This will prevent confusion.

3. Overseas phone operators; it is strongly recommended that you indicate which portion of the phone band, American or foreign, you intend to cover.

4. C.w. stations; calling on or off the frequency of the DX station, must be left up to the individual operator. This is generally governed by the technique of operators at the DX station.

xiii.—Log Instructions

1. In keeping log, fill in Zone number and Country **only first time** it is contacted on each band.

2. Use a separate sheet for each band and a final tally sheet or report form.

3. Keep all times in **GMT.**

4. All contestants are expected to compute their scores. Logs should be checked for contact duplications and proper point credit before they are submitted.

5. Make sure name and address is clearly noted on each log. Print or type.

6. Each contestant must sign a pledge that all rules and regulations have been observed.

7. If official log forms are not available, it is hoped that a duplicate form will be used. The size is 8½" x 11" with 52 contacts to the page.

8. Copies of the Zone and Country list and log report forms are available from "CQ", address listed below. Send a self addressed stamped envelope, or in the case of overseas stations, IRC coupons. Make sure to include sufficient postage, state how many sheets are needed and allow sufficient time for mailing.

xiv.—Rule Changes

The minimum operating time has been increased to 12 hours for single operators and 24 hours for multi-operated stations. This is a contest, not a leisurely week-end at your hobby.

The Committee is also going to be more critical regarding the observations of the rules and the keeping and scoring of your logs.

xv.—Deadline

All logs must be postmarked **no later** than December 1, 1958, for the Phone Section, and January 15, 1959, for the C.w. Section.

Send all logs directly to: **"CQ Magazine," 300 West 43rd St., New York 36, N.Y. Att.: Contest Committee.**

— . . . —

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Cut the ribbon so that a tab of insulation is left after the conductors are bared for soldering. Overlap the tabs, twist the conductors together and secure the tabs by an adhesive or by bonding with a hot soldering iron.

—H. Fanckboner, W9BPS, "QST" Jan. '58.

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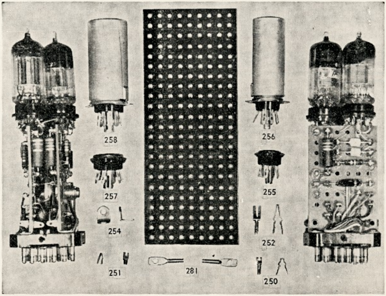

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THE IMPROVED DIPPER

(Continued from Page 14)

end of the coil with the Dipper capacitor set at maximum.

Then, for point to point calibration, the absorption meter is set at the desired frequency and the Dipper capacitor rotated until dip is indicated. The scale should be marked accordingly, using a hard sharp pencil and the special calibrating dial. The marker points may be inked after calibration. As mentioned previously, the grid current will vary gradually over each range; however, resonance is indicated only at the point where a pronounced dip occurs.

When calibrating with a receiver it is merely necessary to turn on the receiver beat oscillator and tune in the Dipper signal. Care must be taken so as not to become confused with harmonics or receiver images. Calibration points are marked according to the Dipper beat heard on the receiver, instead of observing the grid meter dip.

The instrument may be checked against itself in the following manner: Set the Dipper at 1.75 Mc. and tune in the second harmonic at 3.5 Mc. Then, with the receiver left tuned at this point, set the Dipper at 3.5 Mc. as indicated on its scale. The signal should then be heard on the receiver without any further tuning. This should be repeated at 7 Mc., etc., right down the line. If WWV can not be heard at the higher frequencies, the instrument may be set at a lower WWV frequency and then checked on the harmonics in the above manner.

If an absorption meter or receiver is not available for use at the highest frequencies, Lecher wires may be set up and the same procedure followed as with the absorption meter. For general calibration a signal generator may be employed by listening for the generator beat on a pair of phones plugged into the Dipper. With the lowest frequency coil there is about a 2% error with the phones plugged in due to the addition of the 50,000 ohm resistor in the grid return. On the other ranges, the error is negligible and may be discounted.

It must be remembered that the accuracy of the Dipper cannot be any greater than that of the calibration source and the care exercised during calibration. When employing the Dipper, greatest accuracy is realised when the probe coil is placed as far away as possible from other metal objects and when the coupling to the circuit under test is as small as permissible while obtaining an indication of dip.

[As a 100 pF. miniature split-stator variable condenser is rather hard to obtain, some improvisation may be necessary. Ham Radio Supplies have available 105 pF. miniature variable condensers (screwdriver adjustment). By making a "U" bracket and mounting the two condensers inside the bracket, back to back, the two rear rotor shafts can be joined by a sleeve and solder sweated. Then a shaft should be made to slip over the collar on the front of one of the condensers to tune the pair. Make the connection to the collar a tight fit. Of course the usual Amateur ingenuity will find many other means of connecting two of these condensers to form a split-stator condenser.—Editor "A.R."]

AMATEUR TELEVISION

(Continued from Page 25)

Under high speed sweep, at low repetition rates, the trace is of course very dim, as the beam is blanked off most of the time, the active time in the example above is only one in a thousand.

Triggered Sweep

This has to be calibrated in time (duration) and the sweep length adjusted to 4". Assuming all duration capacitors (S8A) have been checked on a bridge before fitting, set duration to 100 μsecs. position. Inject a c.w. signal from a signal generator at about 50 Kc. Adjust sync. gain and trigger threshold controls as necessary for a stable display. Either positive or negative trigger will do. Adjust the signal generator frequency to display an exact integral number of cycles—say 5. The frequency then should be 50 Kc. If not, adjust the two triggered sweep charging resistors shown as 500K and 100K in series, until 50 c.p.s. gives exactly 5 cycles. When correct on one range, it will be correct on all others.

To adjust trace length to 4", adjust the values of the capacitors on S8B to give the correct length, the values shown being nominal. The higher the value, the shorter the trace.

Trigger Delay

This assumes the three capacitors have been checked to give a 1 : 10 : 100 ratio, absolute values being nominal. Inject a 15625 c.p.s. signal (your line pulses) and display on the 400 μsec. duration setting. Use positive trigger on positive pulses, and the reverse, although triggering will occur in the reverse sense, the leading edges are usually sharper. Switch delay to X1. Using "MICROSECOND" dial, shift second pulse to the position of the first. This point on the dial is 64 on X1, and 6.4 on X10. Shift the third pulse to the position of the first. This is 132 on the X1 scale, and 13.2 on X10. With these datum points, use a signal of 100 Kc. to provide 10 μsec. points right round the dial rotation, by shifting one complete cycle left for every 10 μsecs.

This c.r.o. is an ambitious project for someone new to oscillograph construction, but for the experimenter moving into Amateur t.v., it is no more tricky than anything described before. It is a versatile instrument and will become your right hand.

Next month I will conclude this series with a description of a television transmitter.

— . . . —

CORRESPONDENCE

YOUR HELP PLEASE

Editor "A.R.," Dear Sir,

I am an s.w.l. member of the N.Z.-A.R.T. (N.Z. Amateur Radio Transmitter) as well as being an active commercial bands DXer.

The reason for writing is that I will be in Australia for several weeks (approx. six) at the end of the year. At least, will be arriving in Sydney on New Year's Eve.

I am anxious to meet as many s.w.l.'s as possible, and any Hams, too, to say hello. I am trying to plan the tour well before I leave ZL. I intend to spend a week in each State.

—Basil Coombe, P.O. Box 377, Palmerston Nth., N.Z.

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TRANSISTOR H.F. RECEIVER

(Continued from Page 8)

(see coil table). The antenna is tapped at 13 turns through a 75 pF. capacitor. Tracking capacity of 150 pF. was required.

The next switch position (position 2) accommodates the 12 Mc. to 8.4 Mc. coil. On this band the antenna is tapped to the primary at 4 turns through a 50 pF. capacitor. The tracking capacity required was 470 pF. The coil details are to be found in the table.

By using an oscillator coil tunable from 7.25 Mc. to 6 Mc., r.f. injection of harmonics in the range 14.5 Mc. to 12 Mc., it is possible to tune the 14 Mc. band with quite good results.

Both mixer and oscillator coils use 3-30 pF. trimmers for correct frequency adjustment.

HINTS

Current drain from a 6 volt supply without signal is 14 mA. On very strong signals the current rises to 45 mA.

It is advisable to use transistor sockets, as it makes it easy to change transistors around. If the transistors are soldered into place, there is the danger of them being damaged by excessive heat.

The thermistor R32 is used to protect the OC72 class B audio transistors. **Don't leave it out.** The potentiometer R31 is adjusted until the OC72s draw 1 mA. each.

The receiver is very quite in operation. Without an antenna, the set sounds dead, there being no hiss level. Once the antenna is connected, the set becomes quite lively.

The complete set measures 12" long, 4½" wide and 7" high.

One final point. Be sure to by-pass the battery supply, both in the receiver and test set. About 2 μF. should prove satisfatcory.

The author would be pleased to hear from anybody who may construct this receiver, or answer any queries.

[2N112 and 2N138 Transistors are no longer current types. They are replaced by the 2N485 and 2N632 respectively. See advert on page 18 this issue.—Ed.]

THE TA2 SPECIAL

(Continued from Page 17)

Before closing, just a few words on the audio requirements are in order. The use of a conventional speech clipping followed by an audio filter (approximately 3000 cycles cut-off) is advised for best results. However, this is not a "must" requirement. Finding an audio transformer with a ratio between 1 : 2 and 1 : 3 having a split secondary is not an easy job. The compromise suggested by George Grammer, using two transformers with the primaries in parallel and the secondaries in series works well in my rig. Shunt feed, using two filter chokes approximately 10 to 20 henries at 10 Ma. or more should do as another possibility. Tubes requiring low screen grid voltage are easy to drive so one or two watts of audio should be enough for 6BQ6s. My audio set-up was designed for 807s which required a relatively high screen grid voltage and provided much more audio voltage than is required by 6146s. Three to five watts should be ample for these tubes.

My hope is that this will get the ball rolling for d.s.b.s.c. and d.s.b.r.c. If so, maybe we will hear more talk and less carrier on the DX bands of the future.

Last, I would like to give credit to K7BGS (my XYL), though still not convinced that suppressed carrier phone is here to stay, she has been very tolerant of my disruptive influence around the Ham shack.

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G.D.O. APPLICATIONS

(Continued from Page 40)

If you're trying to measure percentage change of voltage or field strength, it's best to run the sensitivity control in the fully "on" position due to meter linearity.

SIGNAL GENERATOR

There are plenty of times when it's handy to have a wide-range medium-powered signal source in the Ham shack. You can use it for numerous receiver tests. The signal can be substituted for the normal oscillator signal of a superheterodyne receiver if it is suspected that the oscillator is out of order. Why build an oscillator for that breadboard receiver you're experimenting on, if you have a dipper on hand already? You can put the dipper on a local t.v. channel and proceed to go out and mow the front lawn just to prove to the neighbors that your transmitter isn't the only device that can produce t.v.i.! Or you can inject the relatively pure output signal of the grid dipper into a t.v. set to demonstrate that sometimes a clean signal on an authorised Ham frequency can cause t.v.i. You can also use the oscillator of the dipper to drive antenna measuring equipment, such as the "Antennascope".

Some models of the grid dip oscillator provide means for modulating the signal emitted by the device. Others are arranged so that a modulating signal from an external source may be inserted into the headphone jack. Better check the design of your particular dipper, before attempting to modulate in this way.

ABSORPTION WAVEMETER

One of the earliest devices for measuring wavelength of a signal was the absorption wavemeter. The dipper, whether it is plugged into the power line or not, may be used as a simple L/C tuned circuit to suck power out of any circuit carrying r.f. current. One precaution should be observed while using the dipper in this fashion around high powered (or even moderately-powered) transmitter stages. Do not couple enough power into the device to flash across the insulation of the internal wiring. The old-fashioned absorption wavemeters had little inside the box except the tuning condenser, and it didn't particularly matter if that flashed over. The dipper, however, has a tube socket, several small coupling capacitors (which may also be used to insulate the unit from the power line) and a tube, all of which may be damaged by application of excessive voltages, so take it easy!

It would not be possible to include all the potential applications of such a versatile device as grid dip oscillator in an article of this type. For further information refer to the articles mentioned in the footnotes, and study the instruction booklets available from manufacturers of these instruments.

APPRECIATION EXTENDED

The publishers of "Amateur Radio" wish to express their appreciation to J. H. Magrath & Co. Pty. Ltd. for their generous gesture in vacating the front cover so that a special design to commemorate the 25th Anniversary of publication of "Amateur Radio" could be printed thereon.

I.T.U. FUND DONATIONS

Listed below are additional subscribers to the Fund to send a Region 3 Amateur delegate to the International Telecommunication Union Conference at Geneva in July 1959.

Amateurs throughout Australia will be pleased to learn that the Postmaster-General has accepted the representations of the Federal Executive of the W.I.A. and has agreed to the Amateur delegate being officially accredited as part of the Government delegation to the Conference.

Many Amateurs may have refrained from sending in their subscriptions as they were not sure of the status of our representative and perhaps thought the monies collected may have been wasted. The recognition of our delegate by the Postmaster-General will now dispel any false impressions that may have been created on this surmise.

Now that official recognition has been made, it behoves every Amateur who has so far not subscribed, to immediately send his donation to:—

Federal Secretary,
Box 2611W, G.P.O.,
Melbourne, C.1, Vic.

Our target figure is £2,500—every effort must be made by Amateurs and by Divisions to assist in our endeavours to reach this figure. Your donations, large or small, are equally welcome.

The following is a list of contributions to 31st August, 1958:—

£10/10/0
C. McC. Hicks, VK2ADV.

£10/0/0
Vic. Railways Institute Radio Club, VK3RI.

£5/0/0
A. Fairhall, VK2KB; Moorabbin Radio Club, VK3APC; Townsville Amateur Radio Club.

£3/0/0
R. W. Johnston, VK2AUJ; J. F. Pickles, VK4FP.

£2/15/0
S. Clark, VK3ASC (from sale of wire).

£2/10/0
A. Roudie, VK3UJ.

£2/2/0
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R. W. Edwards, VK2RE; W. T. Boon, VK-2ZAB; H. J. Bracken, VK7BR.

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P. Huigens, VK2AOH; E. M. Simpson, VK-2ES; F. M. Stean, VK2FZ; C. E. Bardwell, VK2IR; R. N. Sneddon, VK2WS; C. Gibson, VK3FO; E. Wardle, VK3OO; Mrs. G. Churchward, VK3US; R. M. Churchward, VK3VL; Dr. E. Marks, VK3VM; L. F. Shnitzerling, VK4CK; W. J. Robertson, VK4WL; F. B. Bond, VK4ZM; S. J. Smith, VK6SJ; Senator G. Hannan, Vic.; J. N. Paris, S.A.

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T. Isaacs, VK2ABO; C. Orr, VK2ACO; W. Shakespeare, VK2AGF; F. Meyer, VK2AGY; C. Fletcher, VK2ASF; A. Isaacs, VK2AVI; E. Crouch, VK2EC; A. Phibbs, VK2EU; R. Black, VK2YA; R. Adams, VK2YR; P. Pearson, VK-2ZBB; J. Mackie, VK2ZIM; F. Caton, VK2ABQ; J. Young, VK2OY; E. Hocking, VK2AIE; A. Fox, VK2KP; A. Fietz, VK2QE; P. Sara, VK-2QV; L. West, VK2EI; A. Mulcahy, VK2ACV; F. Eade, VK2AEE; A. Magennis, VK2AFE; L. Lee, VK2AQL; C. Jarlett, VK2AZK; N. Young, VK2OS; F. Carruthers, VK2PF; C. Peters, VK2SV; Maj. C. Allen, VK2ALC; D. Kerr, N.S.W.; M. O'Brien, N.S.W.; A. Sullivan, N.S.W.
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R. Simmons, VK5GK; A. McRitchie, VK5CE; H. Bowman, VK5FM; J. Brammer, VK5JN; E. Von Stanke, VK5KU; K. Metcalf, VK5ND; T. Davies, VK5TD; University of Adelaide Radio Club, VK5UA; L. Mullins, VK5XM; T. Drake, VK5DL; H. McCarthy, VK5MC; S. Taeuber, VK5SQ; D. Kelly, VK5DK; R. Richards, VK5DO; D. Scott, VK5DS; J. Watson, VK5JW; K. Ring, VK5KH; W. Bulling, VK-5KX; C. Othen, VK5ON; R. Scott, VK5RU; N. White, VK5ZAW; B. Warman, VK5ZBI; H. Blythe, VK5ZBL; M. Lane, VK5AO; K. Cahill, VK5KC; E. McGrath, VK5MO; R. G. Edmeades, S.A.; F. Forgie, S.A.
J. Hunt, VK6JD; R. Trew, VK6RP; L. Gooding, VK6ZAH; F. Paget, VK6ZBP.
G. Richardson, VK7GR (omitted from July list); T. Allen, VK7AL; T. Connor, VK7CT; L. Eddington, VK7LS; M. McGinniss, VK7MF; P. Frith, VK7PF; F. Nicholls, VK7RY; M. Sidebottom, VK7SK; R. Harrex, VK7ZAC; D. Thorne, VK7ZAI; R. Milne, VK7ZAL; J. Milway, VK7ZAM.
D. Taylor, VK9DT; W. Holland, VK9BW; M. Ewen, VK9CK; M. Lang, VK9ML; L. Howell, WIA-L9005.

Under £1/0/0
H. Fitzsimmons, VK3FI (10/6); E. King-Smith, VK3AKS (10/-); A. Wrembeck, VK4VO (15/-).

Amendments to Previous Lists

August list: Amend R. F. Giles, Qld., to read £1/0/0.
September list: Amend K. Nutt, VK4XD, to read K. Hutt, VK4XD.

The progressive total as at 31st August is £1,513/19/3.

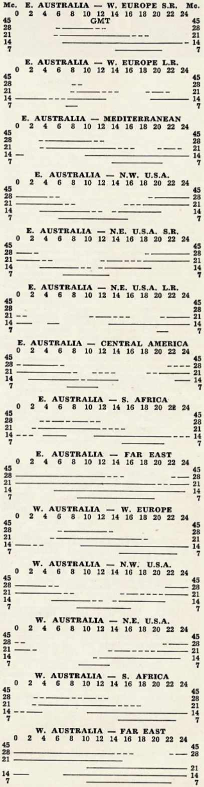
1957 R.S.G.B. TELEPHONY CONTEST
Poor Entry from Australasia

The first three placings of G Hams were: G3DO, 4140 points; G4ZU, 4060 points; and G2CDI, 3765 points.

The first three placings of the overseas entrants were: VQ4RF, 2120 points; ZD4BV, 1960 points; and OH5PE, 1940 points.

Following are the entries from Australasia: ZL3RB, 1045 points, 18th position in overseas entries; and VK2AKV, 615 points, 29th.

PREDICTION CHART, SEPT. '58



D X

Frank T. Hine, VK2QL
30 Abbotsford Road,
Homebush, N.S.W.

The "DX season" is recommencing. By that I mean that as I prepare these notes, 21 and 28 Mc., which have been rather quiet, are now showing plenty of signals and it is certainly easier to work DX on 21 Mc. than on 14.

The crazy thinking that is going on for A.R.R.L. D.X.C.C. credit is further exemplified by the granting of credit to W3ZA/3W. 3W8AA was a very consistent station on all bands, but was not credited due to F.C.C./A.R.R.L. ban on the U.S. Amateurs working that country. Now that a W is there, credit is given. The operator was previously signing **XV5A**. A further instance comes to the fore in regard to HB9SI, who is operating for the United Nations Radio at Geneva. The latest information is that he may be granted separate country status and be using the call **4UZA**.

If the licensing authorities in **U.S.** maintain their current policy, the death knell has been sounded for rapid QSOs with DXpeditions. There have been a number of citations issued to U.S. Amateurs, the first commencing from the VK2AYY/LH trip, for their adopting the "de W———" procedure. They are required to send the call sign of the station being called. This will prevent what has come to be known as "tailending" when the call of the station calling is sent once as the station in QSO is signing off.

It is pleasing to note a general movement in overseas Amateur Radio journals, to show all times on QSL cards in GMT instead of local times. Those who have taken very active part in DX contests will realise the enormous amount of time taken trying to convert DX local to VK local. Let all VK Amateurs get on this band waggon right away.

I have an interesting article from the Ionospheric Prediction Service, regarding, for those who can remember it, the Geormagnetic storm which occurred on Feb. 11 of this year. This storm was reported as one of the worst in severity ever recorded, and no advance warning was available of the accompanying ionospheric disturbance. One thing has come out of it all, and that is steps have been taken to prevent getting caught like this again.

NEWS AND NOTES

Starting in Nov. '58 and ending in 1963, **OH2HZ** and **OK2HZ**, who are explorers and expeditionists, are starting on another expedition and are going to combine it with a DX-pedition. Proposed itinerary at the moment is: Czechoslavakia, Roumania, Greece, Turkey, Lebanon, Jordan, Egypt, Saudi Arabia, Yemen, back to Saudi Arabia, Kuwait, Iraq, Persia, Afghanistan, Pakistan, India, Sikkim, Nepal, Ceylon, back to India, Burma, Thailand, Malaya, Java, Sumatra, Borneo, Celebes, Australia, Tasmania, New Zealand, New Guinea, many parts of Polynesia, Phillipines, China, Tibet, Mongolia, back to China, Korea, Japan, Poland, and then home. Radio equipment will be installed in two trucks and consist of two KWM-1, which is a transceiver and the type used on the recent DXpedition to Clipperton (FO8AT). The equipment will be used for communications back to base as well as Amateur work. OK1MB will act as QSL manager for the trip. Calls used will be **OK7HZ** plus the suffix/prefix of the country of location. As Amateur activity is not permitted in some of the countries listed, it will be interesting to see what happens when this party arrives.

The DXpedition by the VS1 boys to the **Nicobar Is.** looks like being off, according to VS1FJ, due to the probable refusal of the Indian Govt. to grant the necessary permission. At the time of writing, there is no news of the one planned by the VU boys.

ZS6IF/7 was operating from **Swaziland** this month for one week. QSLs will be on a card for card basis and should go to his home QTH. If he thinks, as a result of this trip, it worth while, he will visit ZS8 and ZS9 next year.

ZD8LN is a foney; **ZD8SC** is leaving the area and his rig will probably be taken over by **ZD8JP**.

VP2LO is on from **St. Lucia** using c.w. on 14059 Kc.

EA6AF is at present doing some training in the U.S. and is due back in Balearic in Oct.

CN8GU is returning to the U.S. and indications are that another CN8 will take over the QSL chores of **ZD7SA**.

DX activity is expected from the **Galapagos Is.** late in Sept. or to Nov. on 14, 21 and 28 Mc., mainly on s.s.b. Calls are expected to be HC8LUX, AGO and WGF. Looks as though if one wants to be right on the ball for DX-peditions to the rare ones, s.b. is a necessity.

Trinidade Is., PY0 is expected to gain separate country status about December with credit acceptable back to 1945.

FO8AT on **Clipperton** adopted excellent procedure towards the end of his stay, by putting the U.S. stations on the l.f. side and the DX on the h.f. side of his frequency, and alternating each five minutes between each.

OY7ML has been heard in Sydney on 14020 Kc. cw. round 2100z. As he also works 21 Mc., he should be a possibility. I found him easier on that band than 14 Mc. If you have worked **Chatham Is.**, now with separate country status, after 1945, and you hold the necessary piece of pasteboard, it is acceptable for credit for A.R.R.L. **D.X.C.C.**

I feel an extract from "QST" in regard to the disallowance of **ZL1ABZ** cards for credit may help those who do not know: "beyond any doubt that in many cases no direct contact with ZL1ABZ was ever made, yet confirmations were received for these 'contacts'. A QSL is . . . that a two-way change of information has taken place between the station sending the QSL and the station to whom the QSL is made out." [See also mention of same matter under heading of "Federal Awards Manager".—Ed.]

1200 QSLs from **JT1YL** are in course of distribution and some more from **JT1AA**. OK1JX, who is handling this chore, had to curtail his activities for a while due to other work.

Tanna Tuva activity is reported on 7 Mc. by UA1GR/0.

Jan Mayen is expected to be represented after Sept. 20 and should last for one year. Call signs are at present unknown.

AC4AX has been reported on c.w. on varying frequencies on 14 Mc. band.

50 Mc. DX has commenced with VK2, VK4 and VK9 working JA stations. **XE1GL** has made a request that VK stations look for him on 50.005 Mc.

Current activity from the Antarctic region is given by, in addition to the VK stations, CE-9AR, ZL5AE, OR4VR, UA1KAE, FB8YY, FB-8XX, FB8ZZ, KC4USB, KC4USK, and KC4USH.

For the s.w.l's., Don Grantley reports that **DM3IGY** is transmitting a test c.w. signal on approx. 28.2 Mc. He heard him at 0915z seeking reports on his signal and guarantees a QSL. As you can see by his call letters, he is connected with the I.G.Y. programme. QSLs may be sent direct or via the Bureau to Geophys. Obs. Collm., near Oschatz, Germany, D.D.R. As 28 Mc. will improve from now, he should be easily found.

ACTIVITIES

3.5 Mc.: 3AHO: VK9AD.

7 Mc.: 3AHO: ZE3JC*, ZE2JE*, ZS6KD*, ZE6IJ*. **WIA-L2001:** W6BPM, KH6BEK. **WIA-L3039:** JA3DX/MM. **BERS195:** on c.w. DU-9WX, JA, VR2DA, W and 150 Europeans.

14 Mc. C.w.: 2AGH: PY1DG*, RAEM*, EA-6AW*, CR9AH*, YN1AA*, FO8AT*, CN8KC*, EA9AQ*, EL1X*, XW8AI*, HK4JC*, ZS6IF/7*, UR2BU*, VP2KF*, ZD1FG*. **2AHH:** G2ATF* long path, TI2PZ*, HK4JC*, UA3OA*, ZS4LB*. **2AMB:** GW3*, KL7*, XE1RM*, OR4VN*, VK-0IJ*, VK0AT*, FF8AC*, TI2PZ*, GM*, ST2AR*, ZD7SA*, FO8AT*, ZD1FG*, FA3QL*, EL1X*, YN1AA, BV1US, KW6CE, KS6AG, FO8AD, XE-1XK, FB8XX, LU6SJ, LU8DO, CR6AI, VQ2AB, KM6BM, KM6BL, VE8YN, JZ0DA, KW6CQ. **2QL:** OR4VN*, ZD1FG*, EL1X*, VQ2EW*, VQ2GW*, VQ3CF*, FQ8AP*, UP2NM*, FU8AE*, ZS6IF/7*, JT1AA*, CR7BN*, UD6AM, UD6AK, JZ0DA, VP2GL, FQ8HA, CR7CI, CR6AI, CR6AP, VQ6AB, VQ8AJC. **2ZR:** UQ2BA*, CN8DJ*, UP2KBX*, UP2NX*, UC2KAA*, UQ2AN*, and many Europeans plus EA1BC*, UC2KAR*. **3AHO:** JT1AA*, VP2VB*. **4DO:** UA0KZA*, G*, UR2BU*, SP3BL*, ON*, VK0TC*, KX6CD*, LZ1AH, FA8RJ, XW8AI, ZP5LS, LZ1KPC, EA3KI, FO8AT. **9XK:** VP2VB*, FO8AT*. **WIA-L2022:** CR9AH, CN8JX, FB8XX, FK8AS, FO-8AC, FO8AT, FU8AE, HC4IM, HS1C, HK4JC, JZ0DA, JZ0HA, KB6BJ, KP4AR, KM6BL, MP-4AOO, LZ1WD, TI2PZ, OR4VN, YJ1DL, UB-5IF, VR2DG, 4X4KR. **BERS195:** CE9AR, BV1US, CP5KE, FB8XX, FR7ZC, FU8AE, FM7WU, FO-8AC, HC4IM, HS1C, JT1AA, JZ0DA, KM6BL, KX6BT, OR4VN, PY2KT, SV0WT/Crete, XE-1XK, XW8AI, YV5BX, ZK1AK, ZK2AB, ZS-4LB, PI1LC. **WIA-L3039:** VQ3RF, KM6BL, VR2DA, YJ1DL, UA0FC, SP9RF, EA3KT, KP4AJO, SV0WP.

14 Mc. Phone: 2AMB: KX6BT. **2AGH:** CO-2SW*, VQ9GU. **2AHH:** G3LFO* L/SR, VR2DA*. **3AHO:** CN8MM*, ZS*, VP2VB*, YV5AE*, YV-0AB*, HB1TL/FL*, 9G1BF*, VQ9GU*, YU1AD*, PY4AS*, HL9KR*, CO2YZ*. **3AOM:** XE1RM*, XE0PPE*, VE*, G*, GW*, DL*, CT2AH*, HK-4DP*, EL3A*. **4DO:** KL7*. **WIA-L2001:** EA3JE, HP3FL, VS2DQ, FK8AS, OA4GW, VR2BJ, PY-2CK, VK2FR, VK0AT, VK0DA, BV1US, CO2BL, CT1DU, PJ2AQ. HS1C, KL7, ZK2AB. **WIA-L2022:** DU6IV, EA3JE, FK8AS, HK7LX, KA-0IJ, OA4DA, OA4EP, VR2DG, VR1C, YV5EC, ZK1BS, ZK2AB, ZL5AE and many Europeans. **BERS195:** VK0IJ, VK0KT, MP4BBT, VK0TC, VP5FR, VU2CQ. **WIA-L3039:** VK0KT, ZK2AB, XE2NF, HL9KT, VE2CA, HK4HW, BV1US. **Ian Thomas:** W1 to 0 excluding W6, ZL1 to 4, VK-0KT, VR1A, KL7, OA4BA, FK8AS, FK8AU, VR2DA, VR2BJ, VK2FR, DL3IR.

21 Mc. C.w.: 2AGH: UA9VB*. **2AHH:** ZB2I* L.R., KC4USK*, UA4IF*. **2QL:** ZP5CF*, KX-6BT*, FA8TT*, VQ5EK*, ST2AR*, UQ2AN*, SP2BE*, VP3LS, ZS5BA, VQ3HO, OA4FM, ZD2GWS. **2ZR:** GD3FXN*, GI3GPE*, ZS5BA*, CR9AH*, FA3OA*, FA8TT*, UQ2AN*, XE1AX*, SP1KAA*, and a long list of Europeans. **4DO:** W*. **9XK:** ST2AR*. **WIA-L2022:** EA2CR, GI-3IVJ, GM3MCH, KW6CO, SP3FL, UR2BU, UR-

* Call signs and prefixes worked.
z —zero time—G.M.T.

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We would be happy to advise and quote you as to the most suitable crystal for your particular application, either in the pressure or vacuum type holder.

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2KAE, UA4IF, UA9VB, VP7BO, XE3BL, ZS2AT, YU1DO.

21 Mc. Phone: 2AHH: On L.R., OE7SU*, EA3JE*, I1SM*, CN2BK*, G2MJ*, F8US*, DL-3AO*, CN8GH*, S.R. SM5CO*, G*, KL7CI*, KA7MD*, KC4USK*, KH6CCL*, VR2AZ*, JZ-0PB*, SM*, OH*, GM*, GW*, VE3BQL/SU*, ZS5PG*, ZS1JA*, ZS4BH*, KB6BH*, PA*. **3AHO:** JZ0PB*, VP5FH*, VP1EE*, VS9MA*, UA1BE*, HL2AG*, OK1MB*, HP1LO*, VP2VB*, VS5BY*, G*, F*, DL*. **4DO:** KB6BH*, G*, GM*, KP4GN, VP6JC, VK9CP, JZ0PB. **6EJ:** SV1AE*, G*, GI*, CN8*, KH6*, VK9NT*, VP-9IVM*, VK0TC, EA*, IT1ZDA*, GD3*, VS9MA*, EI*, LA*, 4X4*, VP1EE*, UQ2AN*, ST2AR*, XE2KW*, KB6BH*, ZS*, ZE*, VQ2VZ*, GC-6FQ*, VE3BQL/SU*. **WIA-L2022:** CR9AI, CN-2BK, DU1GF, GM3EST, G, HK3FV, HP1CN, KG6FO, OH, OZ, KB6BH, TI2AB, VP5RD, VR-2AZ, YV5EB, XE1CB, SM5CO.

28 Mc. C.w.: 2QL: W*, ZC4AX*, ZE, OQ5. **4XJ:** ZS5S*, ZS6AUT*, UB5SB*, UI8AG*. **WIA-L2022:** W.

28 Mc. Phone: 2AHH: ZP5JX*, HK3FV*, W*. **4XJ:** ZS6KO*, UB5SB*, W*, TI2GC*, ZS6SA*, OA4UA*. **6EJ:** VK9DB*, VQ4FK*, ZS6SA*, ZS2DY*, ZS6ACN*, 4X4IX*.

50 Mc.: 4XJ: JA3IW*. **9XK:** 60 JA covering all districts, VK4NG*, VK4ZAZ*.

QSL SITUATION

2AMB received cards from CE2AP, CR6CZ, GW5TW, CN2AQ, CX1AK, GD3FXN, VQ4GP, ON4FL, KS6AD, VK2AYY/LH. **2AGH:** VK-2AYY/LH, YV0AB, VP2VB, UR2AO, UC2CB, OZ7UU, OE2KF, UA3AZ. **2QL:** OY7ML, YV-0AB, ZD7SA, EL1X, FS7RT, SV0WQ/Crete, UR2AO, VQ4KRL, VK0TC, VK0IJ, UR2BU, GD3FXN. **3AOM:** TI2OE, TI2CAH, 5A1TV, HK-3PC. **6EJ:** ZS for 3.5 Mc., ST2NG, GD3UB, GW3SVR, FB8BS, OQ5FH, HS1JN, 9K2AN, VE-8PB, VK0AS, UH8KAA. **BERS195:** CR7CI, CR9AH, EA9BM, HK1FF, JZ0HA, KP6AL, OD-5BZ, UA4HI, UD6BI, VO2HR, VQ2RG, VQ4GQ, VS1BB/VS9, 3V8CY, XV5A, 4X4CK, 4X4WF.

QTH OF POSSIBLE INTEREST

FU8AE—Port Vila.
JZ0DA—QSL via V.E.R.O.N.
VP2GL—Box 44, St. Georges, Grenada.
EL1X—Box 18, Harbel.
VQ2EW—Box 58, Ndolei.
VQ3CF—QSL via W2CTN.
VQ8AJC—Box 155, Mauritius.
UR2BU—Tarki, Estonia (4DO).
EA9BM—Pabillones de Regulares, Alcazarquiver (BERS195).
XV5A—L. Rundlett, M.S.U.G., Box 34, San Francisco (BERS195).
XE0UUE—QSL to W0UUE.
Ex-XW8AG—Rene Maspimby, 9 Rue Ornaud-Bernard, Toulouse, France.
Ex-ZD3G—13 Tedder Ave., Wayfields, near Chatham, U.K.

One of the contributors has suggested that it could be of value to those who do read these notes, that the time and path of communication be included. I have never done this for the reason of the elapsed time from the QSO until these notes appear. However, if readers think that there would be some value to them with this information despite the change in propagation conditions over the period, let me know with your next despatch, and whatever the majority wishes will be done. After all, I know what is in these notes a month before you do.

And now we wind it up once again with thanks to **W4KVX** for his kindness in sending the DX Bulletins; **2AHH**, welcome to the page, Noel, and thanks for suggestion and don't let this be your first and last contribution; **2AGH:** who is still adding the new ones and reached 210; **2AMB**, very pleased to at last get zone 35 in the bag, and after all his efforts works two in the month; **2ZR**, still able to work plenty of DX and get QSLs in return; **3AHO**, another new contributor, we give a pat on the back for giving VQ9GU his first VK contact, let's hear more from you Bill; **3AOM**, who advises his son, VR3A, making good progress; **4DO**, who is coming to Sydney to see what makes the VK2 boys tick; **4XJ**, whom we wish well in the forthcoming 50 Mc. DX season; **6EJ**, who is naturally happy at receiving his 3.5 Mc. S. African confirmations; **9XK**, glad to hear from you Russ and keep an eye out for that Mexican on 50 Mc.; **Don Grantley** has now started to send out swags of QSLs, so give him one in return fellas, he is WIA-L2022; **WIA-L2001**, who has livened up his rx and expects better listening; **BERS195**, hope the XYL now 100 per. Eric; **WIA-L3039** now with an AR7, but trying to reduce the vibrator hash to hear more DX on it, and finally **Ian Thomas**, who is dragging the DX through on his small rx.

Finally, on behalf of all DXers, may I congratulate "Amateur Radio" on reaching its 25th Anniversary, and those concerned with it for an honorary, and I bet onerous, job well done.

S W L

Ian J. Hunt, WIA-L3007
211 St. George Road,
Northcote, N.16, Vic.

To begin this month's notes I must add two items which, most unfortunately, I did not include last month. The first of these is to pass our congratulations to Gill Robinson, a member of the VK3 Group, on having passed the Full Ticket at the July exam. Gill is already on the air and no doubt having a fine old time. The second matter I must mention is a visit by VK3 Group members to the home of 3LN on 15th July last. Len demonstrated everything from voice controlled equipment to hi-fi sound. Len's gear includes Amateur t.v., panoramic adaptor, beams for h.f. and v.h.f. bands with tx's and rx's to match, all home built, and even a second shack for one of the junior ops. next door. Phyl, Mrs. 3LN, prepared a most enjoyable supper to which we did justice. We thank you very much Len and Phyl for your kindness and hospitality in having us at your home.

VK2 GROUP

Now to our correspondence. A letter from Barry Cartwright tells us the latest from the VK2 Group. Two of the boys up there were successful in passing the A.O.L.C.P. at the July exam., namely Bob Luthor, VK2 Group Vice-President, and Ken Oliver. Congrats. chaps from all of us down here.

Barney Smith, Chairman, and Barry Cartwright have been working on their rx's and now have them functioning smoothly. Don Grantley by all accounts did very well in the R.D. Contest and with the aid of his new converter is hearing plenty of rare DX. Les Stahl, of Richmond, a new member of the Group, has a Hallicrafter S38D rx and is a keen listener to all bands—80 to 10 mx. Les is Secretary of the R.A.A.F. Radio Club. Barry has the re-building of his 3-tube converter well in hand, but is having trouble getting his W8JK antenna to work properly. A 600 ohm open wire feedline plus a good antenna coupler should do the trick Barry.

The VK2 Group recently enjoyed, in the company of the V.h.f. and T.v. Group, a tour of television station ATN Channel 7 at Gore Hill and later proceeded to the studios of ATN at Epping. Thanks are extended to the V.h.f. and T.v. Group, who arranged the outing, for having the S.w.l. Group along. Rex 2YA, of Gosford, has taken the local s.w.l.'s there under his wing. He has put forward some very good ideas to assist listeners generally about which we hope to hear more in the near future. Some members have spent a couple of week-ends at VK2WI at Dural trying to improve the area surrounding the station by the removal of trees, bushes, etc., but could do with a few more helpers in this project.

S.W.L. OF THE MONTH

Featured in this section of our notes we meet Bob Wallace, who is a recent newcomer to the VK3 Division. Bob has been in the Permanent Army for seven years and holds the rank of Sergeant with the Royal Australian Electrical and Mechanical Engineers. He is a vehicle motor mechanic and inspector and can test and drive anything from motor cycles to Centurion tanks. Apart from radio Bob loves working on cars and sports cars, specially tuning up for performance and speed.

Bob is stationed at Bandiana near the Victorian-N.S.W. border, and keeps his 2 mx gear with him. At his home at Ampitheatre, he has his best shack which contains much gear, including 108s, 101s, Command tx's, 3 No. 11 sets, an SCR522 and much other equipment in various stages of construction and destruction. He uses an Eddystone 750 rx for s.w.l'ing and spends his time over the week-ends listening from 10 through to 80 mx. For the higher frequency bands he has home-built converters and beam antennae.

He has passed his A.O.L.C.P. and is now practicing code. At present awaiting allocation of his "Z" call sign, Bob intends to operate mobile between Albury, Ballarat and Melbourne on a frequency of 144.342 Mc. and asks the 2 mx gang to look out for him.

VK3 GROUP

At the annual meeting there were 25 members present including new members Mark Preston of Ascot Vale, Barry Tucker of Regent, Ron Rose from Nunawading, and Ian Thomas from North Clayton. Many interesting reports were received from members and stories of the R.D. Contest told. Arrangements were made for a working bee in the very near future to give the Institute rooms a general clean up.

Results of the election were: President, Michael Ide, WIA-L3015; Vice-Presidents: Geoff Morris, WIA-L3017; Ian Woodman, WIA-L3006, VK3ZBI; Secretary-Treasurer, Maurice Cox, WIA-L3055; Asst. Sec., Ian Hunt, WIA-L3007; Delegates to Divisional Council: George Robertson, VK3WJ; Ian Hunt, WIA-L3007; Organising Committee, Bert Stebbing, WIA-L3050; Len Poynter, WIA-L3001; Ted Wickett, WIA-L3063; John McEwen, WIA-L3040; Peter Neilsen.

Upon his retirement as President of the VK3 Group for the last four years, we wish Len Poynter the very best of luck in the future and thank him for the fine job he has done over that period. I myself as retired Secretary of the Group after only three year of it, wish to thank all the members who have assisted me in my job.

At the October meeting, Mr. Robert Gillies, of the Dept. of Supply, will speak to members on the subject of Electronic Computers. This should be a most interesting evening, so roll up in full force and hear what he has to say. All interested persons are welcome and we hope to see a number of the Full members present.

Yours truly will continue to compile the notes for this page of the magazine, but you are asked to address any correspondence regarding enquiries about the Group to the Secretary, Maurice Cox, Flat 1, 37 Boyd Crescent, Olympic Village, Heidelberg West, N.23.

Dave Jenkins, of Orbost, has been making more changes to his new rx and teeing up power supply arrangements. Dave had a fine time with c.w. in the R.D. Contest, what with having a better ether breather. Another enthusiast now located in Orbost is Noel Tuohill, aged 24, and a telegraphist at the Orbost P.O., having moved over from Lakes Entrance. Noel is obtaining a couple of Command rx's and hopes to be busy listening very soon.

I see in the last issue of "A.R." that the VK6 boys now have been issued with s.w.l. numbers, so we look forward to hearing more of their progress over there.

Have just learned that the VK3 Group Secretary is unfortunately seriously ill and in hospital. We hope Maurice that by the time these notes are read that you will be well on the way to complete recovery.

CARD OF THE MONTH CONTEST

For the month of October 10 cards were entered in this contest. The winner was Ian Hunt with a card from VK0KT, while Maurice Cox was a close second with a very nice card of huge size from W2BDS.

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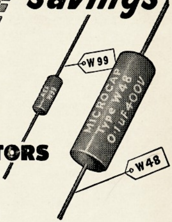

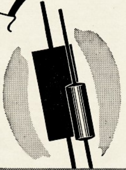

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VHF

Frank P. O'Dwyer, VK3OF
190 Thomas Street,
Hampton, Vic.

Spring this year has not only moved the plants to bud, it has brought life to 50 Mc. with Interstate signals being heard, VK3 by VK5, VK5 by VK4, VK4 by VK3 (details under Div. notes in this section), and JAs once again frequent contacts in VK4, with VK6 sharing in one good opening, Aug. 6 week-end. DU1SW was solid copy to VK6CL at 2200, Aug. 6, and several other DU stations were heard.

The Interstate signals heard indicate that all Divisions were caught asleep, the winter habit of natter sessions preventing a sharp watch being kept on the band. Let heed be paid to Lance's (4ZAZ) suggestion last month that at least the band be scanned between overs for any DX call.

NEW SOUTH WALES

We are all sorry to hear that our good friend, Dave 2AWZ, will be on the sick list for the next couple of months. We will miss his smiling face and little red "bomb" and hope that he makes a speedy recovery.

In Dave's absence, these notes are being prepared by the so-and-so Chairman, who may take the opportunity of "getting square" on some previous scribes and others—no names mentioned.

The outstanding feature of the August activities was the Group's visit to Television Station ATN on Friday, 8th August. Allan 2AH conducted forty of our members over the tx at Gore Hill and from there we journeyed to the studios at Epping and were treated to a very nice supper and were then shown the activities and equipment at the studio. This evening was considered by those who attended to be one of the most interesting events arranged by the Group and our thanks have been expressed to the management of Channel 7 and to Allan. Incidentally, Allan is one of the few people in Australia who has worked ZL on 2 mx.

The next highlight was the inaugural Sunday evening broadcast from VK2WI at Dural. This broadcast was fittingly done by the old master himself, 2OA, better known as Winchy, and by other names which may not pass the censor. The 2 mx equipment at Dural has been constructed by Horrie 2HL (tx—829 runing 90w), Dick 2ZCF (modulator, including tone oscillator), Winchy (power supply) and others, and again our thanks are due to these good folk who have given freely (after some arm twisting) of their time.

One of the interesting features is the 16 element phased array which was hoisted into the heavens one Sunday by Dave 2EO, ably assisted by some and impeded by others and their harmonics. This array was frabricated by one of the commercial manufacturers and is a most imposing piece of equipment and what's more, it works as well as it looks—at the time of writing the only thing that is not known is the "damage"!

In future as far as it is practicable, the Sunday evening broadcasts will be done from Dural and where it is not practicable, they will be made from the home station of the Committee Member doing the broadcast under the call sign of VK2WI/Portable. It is hoped to get a far greater coverage than heretofor.

The man with the "mostest" mobile signal on 2 mx was our fox for the Night Hidden Tx Hunt, held on 27th Aug. Dick 2ZCF had himself very nicely planted in the scrub near Pennant Hills and it was with some difficulty that he was eventually located by all hounds. The first in was Phillip 2ZBB, followed by Bob 2OA, who just pipped Jim 2PM by about half an hour. The Norman and Williams families provided a very nice bush supper, which was a happy ending to a very pleasant evening which saw some new partakers of the hunt craze; these being Bob 2ASZ, Ron 2ZBG, Phillip 2ZBX and Tony 2ZBU—with their appetites whetted we are sure to see more of them.

By the time you read (if you do) these notes an interesting lecture will have been delivered by Bob 2QZ on "The Cathode Ray Oscilloscope and Some of its Applications."

Don't forget the mobile motto, "Have Hams, Will Hunt"—and how!!!!

VICTORIA

V.h.f. Meeting.—The weather was very poor for the night of the August meeting, however some of the more hardy v.h.f. enthusiasts managed to make it. Jock 3ZDG was called upon to fill the gap when other arrangements failed and once again he responded nobly with one of his "off the cuff" v.h.f. lectures. Jock, who is a mine of information on subjects of v.h.f. interest, spoke on a variety of subjects ranging from beam construction to converter design on 288 Mc. and managed to hold the attention of the Group for a good two hours.

Very little business was discussed but the Group did decide to hold a 2 mx scramble on the second Sunday of each month. The scramble will follow the same lines as the 6 mx one, i.e. will be held between 1945 and 2015 hrs. and at the conclusion scores will be taken by a control station. The control station will be the winner of the previous scramble. By the time this reaches you, the first scramble will have been held, but don't miss the October one to be held on the evening of the 12th.

6 Metres.—Things have been very quiet on 6 mx in VK3. For some time most activity is heard on scramble nights. Sixteen stations were active in the scramble held on the fourth Sunday of August, and Don 3ZFP managed to work all possible stations, second was Garth 3ZFA, who worked 14 stations, and equal third were Lance 3AHL and Jock 3ZDG, who worked 13 stations each. Don't forget the 6 metre scramble is held on the fourth Sunday of each month between 1945 and 2015 hrs. and the more contestants the better the scramble, so be in it!

Lindsay 3ZEW, who was recently operating portable in Melbourne, tells us that quite a few stations are operating on 6 mx near his home location in Hopetoun. They are 3ZFD at Horsham on 51.0 Mc., 3ZFM on 50.39 Mc. at Telangatuk, 3ZEA on 50.4 Mc. at Rainbow, 3NN on 50.125 Mc. at Yannac, 3ZCL on 50.04 Mc. at Hopetoun, and last but not least, Lindsay himself on 50.25 Mc., so while you're looking for the elusive DX take a look for these stations, particularly between 1915 and 2000 hrs. each evening.

Bob 3ZAN has found that dural beams are fairly liable to corrosion and has had to temporarily replace his long yagi with a dipole; he hasn't been idle, however, and passes along the hint that die-cast welding rod does a very good job of soldering elements into beams.

On Sunday, Sept. 7, 4LK was heard in VK3 off the back of his beam while he was busy working JA. Despite many calls, no contact was made, the JA QRM in Charters Towers must have been too heavy.

2 Metres.—Activity is pretty low on 2 mx and most operators seem to have hibernated till summer. The Ballarat Group, however, seem to be made of sterner stuff than their Melbourne counterparts and are doing a fine job in keeping the band populated.

1 Metre.—Mac 3QO is the second Melbourne station to be received by George 3ZCG, in Moe. Mac has been heard by George a number of times at S8. Another country station to fire up on 1 mx is Ron 3ZER, whose QTH is at Ballarat. Ron is running 20w. to a QQE03/20 tripler and although he hasn't reached Melbourne yet from his home QTH, he has put an S9 plus signal into Melbourne from Mt. Buninyong. The 3ZAE, 3ZAN, 3ZAI group will have 1 mx stabilised gear for the next series of field days beginning in November, and will be looking for QSOs with country stations with stabilised 288 Mc. equipment.—3ZAI.

QUEENSLAND

Quite a few openings to JA this month and new members of the gang had their first taste of it much to their delight. Bob 4NG was well in the thick of it and Lance 4ZAZ was running him close. Max 4JO gets his share and can be heard working JA R5 S7 to 9, but we do not hear them here in Brisbane. At the moment he is at it, but I am only hearing faint signals with QSB and flutter, no can copy. Bob 4NG is now W.A.J.A. (Worked All Japan Prefectures). Brian 4ZAP is heading Melbourne way for a few months to further his studies and hopes to meet the VK3 gang. We are on the lookout for 3AHJ who expects to be in Brisbane Sept. 25/26.

On 27th August the V.h.f. Group met at the QTH of 4JO, 20 in all were present. 4NG came down from Rockhampton and gave the Group his ideas. Showed his best DX QSLs and played the tape of JA, KH6, VK9 and LU stations, and also a tape of his signal in W land. Allan 4ZBF is heading for VK2 in the near future on holidays and is taking portable gear. A VK5 signal was heard in Rockhampton during the month, a gent testing. Bye, must get back to the rx, the band might have come good.—4WD.

SOUTH AUSTRALIA

The only news in respect to DX is the breakthrough of JAs to VK9 during the Contest. Apparently the VK9 boys were looking for high marks during the R.D. Contest and found the JAs strength 8 to 9 off the back of their beams. VK3ZEH was heard on a folded dipole by George 5ZGA, on the 5th August approx. 6.30 to 7 p.m. He was in contact with two other VK3s who were heard but not identified, sigs. 5 to 6.

Ron's (5MK) new beam on 50 Mc. is satisfactory and all that remains to complete his recent actiivties is his 150w. outboard final. A newcomer to the band is Gilbert 5GX, located at Payneham. Gilbert's rig is a 12AT7 to a 6M5 with intentions of driving a pair of 6146s; his antenna is a 4 element yagi. Jim 5ZBJ has had modulator trouble and was threatening to put the iron into it, which iron he did not elucidate. It could have been the XYL's. Brian 5ZBX is talking about a 35 ft. tower which sounds very nice. This, together with Col's (5RO) 60 footer, shows the inclination of the v.h.f. boys to get their sky wires higher. Col got his tower from Des 5DK, who is moving to VK7, and has only to shift it 150 yards to his own backyard.

Bob 5RT has re-created his 6 mx beam and has it 25 ft. high on waterpipe. Apparently Bob intends to try out his new constant level modulation on the JAs, by using his screen voltage he is able to reduce carrier on peaks of modulation. It sounds quite good too, but is a little rough when there is a tendency to overmodulate.

144 Mc.—This band has only one regular occupant, Reg 5QR, working mostly cross-band to 50 Mc. Keith 5MT, who regularly works Hughie 5BC, is down the south east. Tried a cross-band 144 to 3.5 Mc. with Hughie with the aid of Ken 5KC, but conditions were poor with only strength 2 to 3 reports.

288 Mc.—A little more lively than 2 mx with mobile work from various points, with Vic 5JH working back to town from distant peaks. George 5ZGA very active when not building his 6 mx rig. Lance 5ZBC, Gary 5ZGH, 5JR and 5WR being the most active.

Have you seen the back cover of the September "A.R."? The Geloso v.h.f. v.f.o. has distinct possibilities for an easily built 2 mx rig, the v.f.o. can also be used for combination 6 and 2 mx work using an all-band tank circuit similar to the portable rig in the '48 A.R.R.L. Handbook. Using the xtal portion, it would be possible to couple the antenna feeder straight into the 5763 6 mx tank. Give it a thought fellows, how simple to work those JAs on 50 Mc.—5ZAW.

PAPUA-NEW GUINEA

During August, 9XK (Port Moresby) frequently worked JA between 2000 and 2200 E.A.S.T. During one contact, JA1AXE informed Russ that he had just worked South Africa, making his total 15 countries and the first JA-ZS QSO.—9XK.

Wireless Institute of Australia
Victorian Division

A.O.C.P. CLASS

commences

THURSDAY, 6th NOV., 1958

Theory is held on Monday evenings, and Morse and Regulations on Thursday evenings from 8 to 10 p.m.

Persons desirous of being enrolled should communicate with—
Secretary W.I.A., Victorian Division, 191 Queen Street, Melbourne (Phone: MY 1087)
or the Class Manager on either of the above evenings.

NOTES

FEDERAL

BOY SCOUTS PAN PACIFIC JAMBOREE

This event will be held in Auckland, N.Z., from 3rd January to 10th January, 1959.

The N.Z.A.R.T. intends to install and operate an Amateur Radio Station from the Jamboree during this period and has been granted the use of the special call sign ZL1PPJ (Pan Pacific Jamboree).

Operation of this transmitter will be from 0900 to 2100 NZT (2100 to 0900 GMT) and will cover all bands from 80 metres to 2 metres.

A special QSL card will be used to acknowledge all contacts.

Those stations wishing to arrange skeds with ZL1PPJ are requested to contact ZL1 Amateurs or write direct to Jack Freeman, ZL1VA, who will be particularly pleased to hear from Radio Amateurs who are Scouts or are connected with this Movement.

AMATEURS HELP CHILDREN AWARD (A.H.C.H.)

The Austrian Radio Amateurs Club, in co-operation with the OEVSV, have established the above award which has a two-fold purpose:

(a) To encourage Radio contact with Austrian Amateurs;

(b) To help the work of the S.O.S. Children's Villages which have been established to provide a solution to the world-wide problem of neglected, abandoned or orphaned children, and in order to give such children a real, normal and family-type home, and the security of a mother's love.

This award is open to all licensed Amateurs throughout the world and short wave listeners, and is issued in these classes:

(a) Class Three: Will be issued upon submittance of 10 S.O.S. Kinderdorf QSL cards verifying 10 QSOs with Austrian Radio Amateurs. (b) Class Two: 20 S.O.S. Kinderdorf QSLs. (c) Class One: 50 S.O.S. Kinderdorf QSL cards.

Contacts on all bands, telephony or telegraphy, are eligible, but the same Austrian station may be worked only once per band and type of emission.

Fees for issue of this award will go towards the expansion and upkeep of the S.O.S. Children's Villages and are as follows:

(a) Class Three: 10 I.R.C. (b) Class Two: 20 I.R.C. (c) Class One: 40 I.R.C. These fees may be paid in the currency of any country, cash, I.R.C., cheques or money orders.

ZKF MORSE TRANSMISSION

These transmissions are operated by the R.N.Z.A.F. for the benefit of all would-be morse operators, and those who wish to increase their proficiency. R.N.Z.A.F. have advised that the following is the current schedule.

Frequencies: 3236 and 6885 Kc., Monday to Friday inclusive, at the following times:

1830-1845	5 w.p.m.
1845-1900	10 ,,
1900-1915	15 ,,
1915-1930	20 ,,
1930-1945	25 ,,
1945-2000	30 ,,

The above transmissions should be of interest to all those requiring practice in slow and fast morse.

I.A.R.U. OFFICIAL COUNTRIES LIST

A proposal submitted by the W.I.A. regarding the establishment of an official I.A.R.U. Countries' List has been accepted.

As a result of the acceptance of this proposal, an official I.A.R.U. Countries' List is to be prepared by a committee consisting of the R.S.G.B., A.R.R.L. and the W.I.A.

SPARE VALVES FOR INDIAN AMATEURS

The question of types was considered by F.E. and the conclusion was that any type of valve at all can be put to some use by a Ham.

Tubes should be in serviceable condition, and if the type number cannot be read, should be labelled. Tubes will be sent to the Amateur Radio Society of India for distribution by that body as it sees fit.

Further to the recent note on the above, valves may be forwarded to:—

VK6AG, 327 Wellington Street, Perth, by VK6 Amateurs who desire to do so.

VK9XK, D.C.A. Marine Base, Port Moresby, by VK9 Amateurs who desire to do so.

— . . . —

FED. CONTEST COMMITTEE

The Contest Manager, Mr. Rex Richards, VK5DO, reports that all Certificates awarded to the winners of Contests to date have been posted. Any Australian contestant nominated for an award in the published results who has not yet received his Certificate should contact the F.C.C. immediately. The VK-ZL Contest is included.

Overseas awards may take some time to reach the recipients and a copy of the results was forwarded to each one along with the Certificate.

As this is the last VK-ZL Contest that this Committee will handle, thanks are extended to those Amateurs who made the Contest so popular with the overseas contestants. The compilation of the logs was exemplary. **Please do your utmost to put VK-land into the 1958 one.**

You may have noticed that the Committee has standardised the form of the Rules for each Contest. If not, then take another look, and compare, say Rule 3, in the VK-ZL and the Field Day, when you will see how it has been done.

Whilst on the matter of the Field Day Contest; what about some really overwhelming participation in the Contest this time. The scope of the Contest has been widened and the Committee has made an all-out effort to attract you and YOU and **YOU** into taking part.

Make your plans now. —Chairman, F.C.C.

— . . . —

FEDERAL AWARDS

W.A.V.K.C.A. AWARD

The following are new members of this Award:

W2BUI, KB6BH, W3DKT, and LU5AQ.

Altogether, 89 Certificates have been issued.

D.X.C.C. AWARD

The following are amendments to the current list:

C.w. Section: VK3KB, No. 10, 244 countries.

Open Section: VK3HG, No. 3, 215 countries.

Deletion of Credits. All Kermadec Island D.X.C.C. credits are deleted as at 31/8/58 because of the fact, already well established, that a significant number of QSL cards presented for credit fall into the highly doubtful category. We are, therefore, unable to give credit for contacts with ZL1ABZ.

Additional Countries. Consideration is currently being given to the question of additional countries for the D.X.C.C. list. There are about a dozen of them to be added in due course.

G. Weynton, VK3XU, Manager.

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FEDERAL QSL BUREAU

The new address for the W7/K7 QSL Bureau is: Salem Amateur Radio Club, Box 61, Salem, Oregon, U.S.A.

The Israel Amateur Radio Club, Box 4099, Tel Aviv, Israel, sends a further reminder of their Jubilee Marathon Contest which commenced on 24th April and ends on 31st October. The object is to work as many 4X4 stations as possible. Each 4X4 station can be contacted once on every band during any 24 hours. Each station sending in a log will receive a participation certificate.

On a recent QSL received by BERS195 from John Alvares, CR9AH, it is stated that John is spending most of his time nowadays on 14305 Kc. s.s.b. and only odd bursts on 14025 Kc. c.w. He adds that there are only four current licensed CR9 calls: 9AE, 9AH, 9AI, 9AK. CR9AF is now CT1ID and CR9AL is now CT1BH.

Austine VK3YL, who has already received her card from FO8AT, will be QRT during early September due to moving QTH. Her new address is not so far away from the old one and is 1377 Dandenong Road, East Malvern. Rigging up the shack at the new location has a high priority.

Tom Laidler, VK5TL, who made the Northern Territory contact for so many overseas aspirants for the W.A.V.K.C.A. award, writing from Salisbury, S.A., under date of August 14, wishes it to be known here and abroad that he is no longer at Alice Springs. Tom has sent out cards for all contacts he made while sojourning at the Alice. He ceased activity at that location on Feb. 7. Tom expects to settle down again at Renmark about the end of October. He is presently keeping his hand in on a Type 22 and gave the VK5 Division great help during the recent R.D. Contest. Tom is receiving cards for contacts allegedly made after he had QRT at Alice Springs. Tom adds that as far as he knows the only station in Northern Territory now active is VK5AE at Darwin.

The "A.M.P. DX Club" of Sweden is sponsoring a 1959 Low Frequency Award. A certificate will be available to any station in the world who runs up 50 points during 1959. One point is earned when contacting any country in the A.R.R.L. Country List. The contacts must be made on the 40 or 80 metre bands. The cost of the certificate is 10 I.R.C. It is unnecessary to send confirmations, providing a list signed by a responsible member of your country's recognised Amateur Radio Society is submitted. Applications for the award should be made to SM5CQH, S. Hector, Hjalmstalund, Vallentuna, Sweden.

—Ray Jones, VK3RJ, Manager.

— . . . —

NEW SOUTH WALES

HUNTER BRANCH

Our popular Treasurer, Bill 2XT, should be almost back from his trip to Orange-blossom land by the time this appears in print, so I trust that he has taken sufficient photos to keep an s.s.b. lecturer at bay for another month. Bet he keeps two sections, one to show the Hunter boys and the other to show his XYL, yes fellows, he went alone. A goodly crowd was present at our social to bid Bill bon voyage, as a good-will gesture 2AQR let Bill beat him for the first time at billiards for a long time; rumor has it that Bill's XYL got Alec 2ABU to be on the same ship to keep an eye on him.

CONTEST CALENDAR

Compiled by W.I.A. Fed. Contest Com.

★

VK-ZL DX CONTEST:

Dates: Phone—4th-5th Oct., 1958. C.W.—11th-12th Oct., 1958.
Times: 24 hours from 1000 GMT, Sat., to 1000 hours Sun.
Bands: All h.f. bands (including 11 mx).
Rules: Sept. issue, page 14.
Logs: For VK-ZL Stations—To Contest Manager, ZL2GX, 86 Lytton Rd., Gisborne, N.Z., before 20th Dec., '58.

"CQ" WORLD-WIDE:

Dates: Phone—0200 GMT, Oct 25, to 0200 GMT, Oct. 27. C.w.—0200 GMT, Nov. 29, to 0200 GMT, Dec. 1.
Bands: All h.f. bands (including 11 mx).
Rules: See this issue (Note Rule 8, Sec. 6 and 7).

R.S.G.B. TELEPHONY CONTEST

Dates: Nov. 22 and 23.
Bands: Restricted.
Rules: Same as for 1957 except for scoring bonus for working G3 stations.

ROSS HULL MEMORIAL V.H.F.:

Dates: 1st Dec., 1958, to 31st Jan., 1959.
Bands: All v.h.f. bands.
Rules: Same as for 1956-57. Special Award for greatest distance over 3,000 miles.

NATIONAL FIELD DAY:

Date: Sunday, 25th January, 1959.
Bands: (1) H.f. (2) V.h.f.
Rules: To be published Dec. 1958.

B.E.R.U., C.W.:

Date: Probably January, 1959.
Rules: As for 1958.

OK DX CONTEST:

Date: December, 1958.
Bands: All h.f. bands.

SILENT KEY

It is with deep regret that we record the passing of:—

VK3UI—M. A. (Alan) Rodger, 25th August, 1958.

VK3WE—A. R. ("Bill") Williams.

Fred Leader ("The Monitor"), of New Zealand, 9th August, '58.

Thirty-three chaps were in attendance at our August meeting to listen to Barry 2ZAG give a very interesting lecture on the practical aspects in the application of radio valves and also a dash of transistorised power supplies. The rapid fire of questions shot at Barry was indicative of the interest shown and naturally it was left to Stuart 2ZDF to move a vote of thanks to a "fellow v.h.f.-hound"—his words, not mine. Those present were 2SF, 2ZL, 2AQR, 2AFA, 2CN, 2ANA, 2ADS, 2RJ, 2AOR, 2QB, 2AEE, 2XT, 2FP, 2CS, 2ZDF, 2ZK and associates Sutherland, O'Brien, Bergmann, McLaughlan, Jackson, Prigg, Stobbs, Davis, Nichol, Finch, Richardson, Bailey, Ward, Broard, Witerhall and one undecipherable signature. Two other chaps either missed the book or couldn't write.

Stan 2ZDL doing very well on 144, was 5 and 6 in Sydney the other night, believe several of the boys are contemplating coming up on this band, in fact if a better response to the I.T.U. Fund is not forthcoming, 144 may be all we will have left, that is of course until we have perfected the band and no doubt then we will again be told to shift.

Probably by the time you get this mag., our Dinner will be half eaten, but it will not be too late to get ready to amble forth on the Sunday to Blackalls where an entertaining programme has been arranged.

The usual meeting of the Branch will be held at the University of Technology, Tighes Hill, Newcastle, on Friday, 10th October, at 8 p.m. and the social "do" at 2XT's on Wednesday night, 22nd October.

Any information re these meetings and/or the I.T.U. Fund can be got from me by phoning West Wallsend 6 during business hours or 53 thereafter.—2AQR.

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VICTORIA

Unfortunately for me the monthly meeting which is usually my only source of information for these notes was delayed a week this time owing to school holidays and copy is due before the meeting is held. However, the forced curtailment of the notes on this account will serve a good purpose as space is required for this, the special 25th anniversary issue of our magazine. A truly fine effort for an organisation such as ours where voluntary effort is the order of the day.

However, despite this fine achievement, I feel that we are missing the bus somewhat in other directions as we don't seem to be conscious of our responsibilities in using the bands, even after several impassioned pleas by those who know what this means to the cause. The I.T.U. Fund results to date have been outstanding, which proves that the average Ham has his hobby at heart, but there it seems to end, because he doesn't bother to exercise his rights on the bands provided. You don't have to take my word for this. Just listen around any night or over the week-end when activity should be at its peak and what do you find? Yes, I know, commercials, but there are still a few spots left if you hunt around. Don't blame officialdom for failing to see why we should be allowed to retain our allocation if we don't substantiate our claims to the space.

There is also another very important aspect to be considered in this matter and that is how it affects the newcomer to the bands. We seem to leave nothing to be desired in catering for the prospective Ham in his efforts to get his ticket, but once through we leave him to his own devices. This appears to be the case, anyway, as we have a request from a new Ham for QSOs. His name is Gill Robinson (3VC) of Ringwood, and he is looking for QSOs on 80, 40 and 20. Never let it be said that we can't meet this request.

While on the subject of personalities, the v.h.f. boys and no doubt many others will recall Quinton Porter (3IM), who left for overseas some months ago to further his studies. As a result of these later efforts, he has now completed his Doctor of Science degree and we offer him our congratulations.

The next meeting will be held on 1st October when members of the Publications Committee will speak on the activities of this committee.

As you have heard on recent broadcasts, a committee is investigating the possibility of obtaining other accommodation for Divisional Headquarters as it is anticipated that the rent for the present rooms will soar beyond our reach after restrictions are lifted next June. In order to test the feelings of members in this matter and to obtain guidance in carrying out the wishes of a majority of the members, Council has asked that the subject be thrown open for discussion at the October meeting. Here is your opportunity to air your views on this very important question, so come prepared.

SCOUTS LEARN OF HAM RADIO

On Wednesday, 27th August, three of the local Melbourne boys travelled to Ferntree Gully, about 20 miles from the city, to provide a demonstration of Ham Radio and Short Wave Listening for the 1st Upper Ferntree Gully Scout Troup. They were Norm 3ZBU, Ian 3ZBP and Ian Hunt, Sec. of the S.w.l. Group. They were welcomed by the Scout-Master, Mr. Barrett, and Asst. S.M., Charlie Pennel, and eagerly by the Boy Scouts, about 20 in number.

Ian Hunt opened the evening with a talk on what may be heard on the s.w. bands and demonstrated with the aid of his AMR300 rx. At the finish of his talk he distributed copies of an article on s.w.l'ing for their further guidance. By this time the 2 mx gear was set up and in operation. Ian Davis then gave a short talk on Ham Radio and the big moment had arrived. Norm, with mobile gear in the car, took about five Scouts at a time for a drive around the locality, at the same time allowing them to talk back to their mates in the Scout Hall via the fixed station set up there. A wonderful time was had by all and a QSO with the Diivsional President, 3YS, was squeezed into the proceedings.

WESTERN ZONE

Jim 3AOE of Hopetoun, who has recently built a higher powered rig, has been working some nice DX. His best results have been obtained on the 21 Mc. band. Herb 3NN of Yannac has been active on the 6 metre band, and has had some nice contacts there. Merv. 3AFO of Horsham will spend his forthcoming annual leave in VK6 land, so we wish he and Nora an enjoyable holiday.

A Hobbies Exhibition will be held in Stawell beginning on 11th November, finishing on 15th November. With the help of local Amateurs we expect to have a station operating from there during these times, so we will be happy to have as many contacts as possible.

MOORABBIN AND DISTRICT RADIO CLUB

There has been improved activity on all bands in this district lately. Jack 3VT has been trying out his new wings on the "d.c." bands with 120 watts to 6146s, and has even been heard mentioning DX contacts. (It's all been

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HUNTER BRANCH, N.S.W. DIV.

★

SEVENTH ANNUAL

CONVENTION

SATURDAY and SUNDAY,
4th and 5th OCTOBER, 1958

Canberra Radio Society and South Western Zone, W.I.A.
present
6th SOUTH WEST. ZONE AMATEUR RADIO

CONVENTION

at
CANBERRA, A.C.T.
4th and 5th OCTOBER, 1958
to be held at the **Canberra Club House, Riverside, Canberra.**

W.I.A. VICTORIAN DIVISION

★

SOUTH WESTERN ZONE

CONVENTION

will be held at
BALLARAT
on
SATURDAY AND SUNDAY
NOVEMBER 15-16, 1958

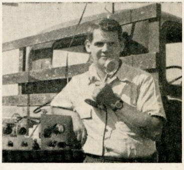
★

Enquiries to Brian Stares, VK3ZBS

OBITUARY

M. A. (ALAN) RODGER, VK3UI

It is with sorrow we learn of the death of Alan VK3UI. Licensed pre-war, Alan served in the Royal Australian Navy as a Radio Operator. His main interest was in v.h.f. work, where his patience and good operating were rewarded with some notable "firsts," both home station and portable on field days. As a W.I.A. member, he has been President of the N.E. Zone of the Victorian Division.



Unmarried, Alan is survived by his mother and sister, to whom we extend our most sincere sympathy.

FRED LEADER—"THE MONITOR"

It is with deep and sincere regret that we record the passing of possibly the best known listener member of N.Z.A.R.T., Frederick Arthur Leader. Fred Leader, known to Amateurs throughout Australasia in particular as the "Monitor", passed peacefully away on Friday, 9th August, last after celebrating his 84th birthday on the previous Monday.

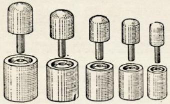
Fred had been a member of the Association since 1931. He was elected as a member of the Executive Council in 1948 and in June 1949 at the Annual Conference he was made a Life Member of N.Z.A.R.T.—the first and so far the only listener member to be so honoured. He was also an honorary member of the ZL Old Timers Club.

Born in Bristol, Fred came to New Zealand in 1910 and became interested in Radio in 1928 since which date he became known to many hundreds of Amateurs for his friendly reports. His election to Life Membership of N.Z.A.R.T., an honour reserved for few, was an indication of the high esteem in which he was held and of the outstanding work he had done for the Association over the years. He not only followed his hobby in a practical manner, but his voluminous listener reports testify that he also interested himself in the Amateur's family and home life. Fred's periodic trips around New Zealand—often accompanied by Monty "The Pilot"—left a trail of boxes of chocolates handed out with old time courtesy to XYLs or children.

The funeral service was conducted on Tuesday, 12th August, by the Rev. Ray Culpitt, ZL2FD, who came from Wanganui especially for the service accompanied by Past President Chas. Berry, ZL2BY. The service was well attended by a representative gathering which included many Radio Amateurs, not only from Auckland but from other parts of the North Island. Pall bearers included Fred's old friend "The Pilot" and President Jack Freeman, ZL1VA, on behalf of the Association.

Fred's wife predeceased him some years ago and he had no relatives in N.Z. To his many friends we express our deepest sympathy.

"WILLIS" CHASSIS PUNCHES



1 3/16"   1"   3/4"   11/16"   5/8"

3/8"	21/-	1-3/16"	35/-
1/2"	22/6	1-1/4"	42/6
5/8"	22/6	1-3/8"	47/6
11/16"	23/6	1-1/2"	47/6
3/4"	24/6		
1"	31/6	1-3/4"	57/6
1-1/8"	33/6	2"	62/6

Any special size requirements made to order.

Q-MAX SCREW-TYPE CHASSIS CUTTERS

5/8"	26/7	1-3/8"	38/6
3/4"	26/7	1-1/2"	38/6
7/8"	29/4	1-3/4"	42/-
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1-1/4"	34/10	1" Square	52/8

One key supplied with each cutter. Spare keys 1/8 each.

PI-COUPLER FOR HIGHER POWER

Compact, bandswitched, high power pi-coupler inductor for co-ax output.
Rated for a max. 1,200v. d.c. at 300 mA. input. Higher voltages on c.w. and s.s.b.
For max. efficiency the 10-metre coil is made of in. silver-plated strip, 15 and 20-metre coils of 1/8 in. silver-plated wire, and the 40 and 80-metre coils of 12 B. & S. tinned-copper wire.
Input capacity 250 pF. max., output capacity 1,500 pF. max. A single pole five-position switch is provided which can be used for switching in parallel capacities when required.
Recommended input capacitor: Eddystone Type 817. Recommended output capacitor: Standard miniature 3-gang BC condenser which is suitable in this position up to 1 kw.

Price: £4/17/6 nett

WILLIAM WILLIS & Co. Pty. Ltd. extends its hearty congratulations and best wishes upon the 25th ANNIVERSARY of the W.I.A. magazine, "AMATEUR RADIO."

With Typical Precision Engineering and Calibration Accuracy comes the GRUNDIG Model 701

GRID DIP OSCILLATOR

- Continuous frequency coverage from 1.7 Mc. to 250 Mc.
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Price: £33/15/0 (includ. Sales Tax)

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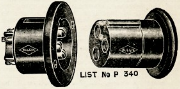

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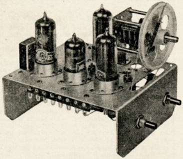
Bulgin Type P73, similar to illustration, **Flush 3-Pin Plug and Socket.** Ideal for any equipment, **7/- each.**

GELOSO PI-COUPLER

Another winner for the Amateur. The answer to TVI and antenna matching. Will match any impedance from 40 to 1,000 ohms over 80 to 10 metre Amateur bands.

Price (inc. tax): **31/6**

VFO's FOR THE A.O.C.P. AND LIMITED A.O.C.P. LICENSE HOLDER



4/103 V.F.O. UNIT EXCITER

MODEL 4/103 V.F.O. UNIT EXCITER

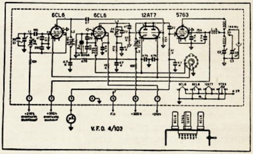
Freq. Range: 144-148 Mc.

R.F. Power Output: Sufficient to drive an 832 or 2E26.

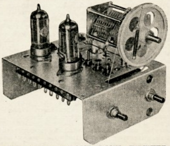
Valve Line-Up: Two 6CL6 oscillator multipliers, one 12AT7 multiplier, one 5763 driver.

The unit incorporates two different oscillator multipliers, one variable for establishing communication, one crystal-controlled fixed frequency oscillator for working.

Price: £12/1/11



CIRCUIT DIAGRAM FOR 4/103



4/104 V.F.O. 6-BAND UNIT EXCITER

MODEL 4/104 V.F.O. UNIT EXCITER

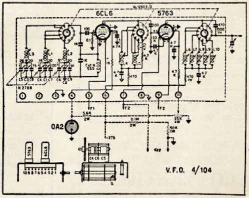
Six Bands: 80, 40, 20, 15, 11, and 10 metres.

R.F. Power Output: Sufficient to drive one 807 or 6146 for phone or c.w.

Valve Line-Up: 6CL6 oscillator, 5763 driver.

This is an oscillator exciter of high stability, because of its conveniently selected C/L ratio and the 6CL6 oscillator tube employed.

Price: £10/19/5



CIRCUIT DIAGRAM FOR 4/104

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done before!) Max 3DF has been busy airing his new call sign with a 122 set, and Laurie 3CN has also been trying out his new 122. Best score to date has been a ZL on 80 mx from a 14 ft. whip from 3CN. Others who got 122s included Ed 3EM and Col 3XV. All this promises plenty of competition in the next Field Day.

Our President, Stan 3ZE, is back from long service leave with a real Queensland suntan. He couldn't get back to the rig fast enough!

Our first meeting at 3EM's shack was quite a success. The smaller room dimensions made us look like quite a crowd. Meetings will continue for the time being at 267 Jasper Road, McKinnon, on the third Friday of each month.

GEELONG AMATEUR RADIO CLUB

Some of the highlights of the past month have been a disposal sale, a visit to various educational institutions to study electronic equipment displayed, and a report on the restrictions of Amateur Radio. The disposal sale was well attended and a wide variety of items was offered. It was particularly pleasing to see the bargains available for new members and most present took home something, even if only to use as paper weights.

A prominent number of club members visited the displays offering at the Royal Melbourne Technical College and the Gordon Institute of Technology. Everyone was impressed by the layout of the exhibits and the ease with which the working of the models could be studied.

The local branch of the W.I.A. has for many months been negotiating with the P.M.G. to practice emergency work by assisting local organisations. We have been asked to assist the local Sea Cadets, Boy Scouts, the C.M.F. and other organisations. There are a dozen licensed transmitter-equipped mobile units and a great number of s.w.l's. which could be called on in an emergency. However, this assistance is outside the scope of Departmental regulations and it is a pity that some full-time practical experience could not be adopted as in New Zealand and in some other Australian States. We hope the C.D.E. Net can be a practical working organisation in this locality.

Bill 3BU is still keen on Amateur t.v. and is amassing a lot of equipment to put a picture on the air. Jim 3ABT, Peter 3ZAV, and Dick 3ABK are hoping to work further afield on 288 Mc., so chaps beam on this band from Melbourne, particularly over the week-end. Bob 3IC and several assistants set up a Ham Station at the Ocean Grove Proclamation Ceremony and made quite a lot of QSOs.

QUEENSLAND

The Council meeting on August 8 was not fully attended, due to a number of members being on holidays and transfer. As no inward correspondence could be discussed the meeting was given over to discussion of small points of policy. An apology was received from the Treasurer, Jim 4OB. His QTH at Ipswich makes things somewhat difficult when the meetings are held in Brisbane. Some discussion centred around the advisability of insuring the Technical Library and it was agreed to implement a cover of adequate insurance. The assessing of the Library's value is to be undertaken shortly.

The question of Outward QSL cards arose and it was decided that members should address all communications to Outward QSL Officer, Box 638J, G.P.O., Brisbane. Similarly, it was noted that in some instances, members have requested official action verbally. In some of these cases, not unnaturally, points of interest have tended to be overlooked. Therefore, any member requesting official action, should correspond through the Box number, addressing all communications to the Secretary. This will eliminate misunderstanding on behalf of members and Council.

Have you the latest Call Book and Handbooks? These are available from the Secretary. Only a limited number are available at present, so order your copies early.

During the absence of our Station Manager, Stan 4SA ably conducted the Sunday morning hook-up on 40 metres. Many thanks, Stan, for keeping the organisation running smoothly. Unfortunately we couldn't talk Stan into taking over the Secretary's job. Jim 4PR, the Divisional Secretary, is in Rockhampton, not Townsville as stated in last month's notes.

The August general meeting was not well attended, numbers being below par. Jack 4JO filled in as scribe and considering the length and complexity of some of the motions moved, he did an excellent job. Once again, due to a slight mishap involving the P.O. Box key, the meeting was conducted rather as a preliminary W.I.C.E.N. meeting with Bruce 4ZBD seeking advice concerning the retention of 6 metre band. The last meeting proved just how important is the work of a good Secretary. With Jim still away, it was difficult to obtain the results of various requests submitted at previous meetings. After the meeting closed, Vince 4VJ laid the ground work for an emergency network trial which was held on Aug. 31.

The emergency trial was conducted from 4WI and involved some seventeen fixed and portable h.f. and v.h.f. stations. 4FP had the only mobile in the hook. The exercise was taken a further step forward by the use of recognised report forms and standardised maps. All in all, the emergency run was successful and steps are under way to co-ordinate our networks with other official services. The possibility of obtaining disposals gear for these networks is also being taken to official levels.

It is with regret that we record the passing of Andy 4BW. Andy was one of the pioneers in radio in Queensland and as his association with radio went back to 1910, we felt that here was a significant chapter in the history of Amateur Radio in Queensland. Although it has taken some considerable time to tap sources of information, the results that Andy achieved are surprising. To this end a comprehensive history is being forwarded to "A.R." One particular report, written by Andy himself, covers 50 pages of notepaper. Not only was Andy well known in Amateur circles, but during his lifetime he came in contact with business people, representatives and Departmental officers. He is kindly remembered by all his associates as a grand man. We extend our sympathy to his wife and family in Mareeba.

The last v.h.f. society meeting was held at 4JO's QTH, Clayfield. The meeting was well attended by licensees who were very interested to hear recordings of good DX on 5 and 6 mx. Discussions took place which supported the preliminary action of VK3 in requesting that information, logs, etc., be furnished by Australian v.h.f. Amateurs in order to present a good case for the retention of the 6 mx band. Queensland Amateurs are requested to send information as set forth in "QTC" to the Divisional Secretary. The construction of the Queensland prototype of W.I.C.E.N. Communicators is nicely under way. Anyone seeking information can come along to the V.h.f. society meeting which is held on the third Friday of each month at 4JO's QTH at 8 p.m.

The last 2 mx tx hunt was won by John 4FP who located the rig at Beatty St., Archerfield. Rick 4VR hid the tx in the long grass by the side of the road. Unfortunately the boys had to put up with the severe cold of the Archerfield flats, but the warm coffee and a good supper Mrs. 4VR supplied back at Rick's QTH more than made up for any discomfort. The hunt is coming into its own again with an encouraging number of participants. Be in the fun, come along to 4JO's QTH, 7.45 p.m., first Friday of every month.

TOWNSVILLE

Last meeting of the T.A.R.C. was a little better attended than the previous one, though there is still room for further improvement. Well, what about it boys? After disposal of the usual club business, the boys had a spirited 15 minutes sorting out some gear for sale by 4ZAY, who went away with heavy pockets and light arms, hoping that the corner shop would still be open.

John 4DD gave his long-awaited lecture, his subject being "Operations of D.C.A." He traversed his talk covering the early formation of D.C.A. to the present time, giving a brief resume of gear used in the early times up to the latest aids to navigation. A blackboard was used to give an indication of the many small outposts being manned, some of these giving way to larger stations with greater coverage. He held the audience's attention very raptly when discussing the air passage heights in the main routes along the coast and density of traffic around the capital cities. He pointed out how the small aeroplanes are kept track of in their flights off the main routes. The R.A.A.F. is discontinuing the responsibility of "Air-Sea Rescue" soon, this being taken over by D.C.A. A brief resume of this was given and how the various forces are co-opted when required.

A local Amateur, who has been using the W.I.A. QSL service, has decided to become a member when it was pointed out this service was for financial W.I.A. members only. The VK4 Bureau does not impose any charge whatsoever on outgoing cards. This is a great saving to the chaps who QSL 100 per cent, and only a stamped addressed envelope is required for received-cards.

Congratulations are due to three chaps who faced the barrier last examination. Result, one full ticket and two Z licensees.

SOUTH AUSTRALIA

A display of members' gear highlighted our last meeting, when a wide range of interests in our hobby was indicated by the variation of the equipment displayed.

Two Associate members had exhibits on demonstration, neither of them previously proving their gear together. Bill Simister brought along a t.v. camera that he had made up, beautifully done and complete in all detail. This was hitched to the t.v. rx made and displayed by Alex Adams, and not to the video stages either, but direct to the input, to give an idea of how these things can work. In spite of only ordinary lighting, pictures on the screen were good enough in definition and clarity to recognise those being "photographed". A good exhibit and worthy of the prizes awarded.

Frank Forgie took some points with his e.h.t. supply and control for a c.r.o., an ingenious arrangement of boosted voltage with a poor long suffering 6H6 rectifying the h.t., which shows just how simple these things can be. An excellent idea for the basis of an inexpensive modulation checker. Al Rechner, 5ZCR, took the prize for the rx section, a nice piece of work, too, with Neil 5ZAW walking off with the instrument section, he displaying a g.d.o. and demonstrating how he uses it to measure capacitances. John 5JC gave us look at his mobile rig, wish we could all do work like that John, we try, but don't all succeed.

Les 5AX took his mini-minimeter out of the car and found it had the converter in it also, so he showed us how to get there easily and how small they can be made. Ray Tuck, 5BT, gave us a look at a plug-in noise limiter, John Gazzard his idea of a dummy load, Joyce Martin an audio oscillator (yes, a YL associate who can wield a soldering iron and use side cutters), and to round it off, Dave 5BF brought along a simple tape recorder idea that should inspire any associate to copy.

New members admitted: Associates—J. A. Cooper, of Gawler; E. L. Bennier, of Crafers; and J. R. Edlington, of Suttontown; and the following full members—P. C. Hutchins, 5PH, of Marion; D. W. Rickard, 4ZDK, of Maralinba; and T. F. Robbins, 5AQ, of Leigh Creek. Welcome to the ranks fellows, hope you enjoy membership as much as we enjoy seeing our ranks added to by your joining. We have a lot of things to fight for and protect both now and in the future, which will be more effectively done by a vigorous and healthy membership.

We were all sad at the news of the sudden and severe illness of Joe 5JO, who was taken ill whilst engaged in the R.D. Contest. Hospitalisation was called immediately, and at the time of writing, he is still there under close medical care. Hope you are soon on your feet Joe. Prior to all this, learned, via the grape vine, that his pet hobby, the Brompton and Bowden Boys' Club, had obtained their licence, VK5BA, and hoped to have a signal on the air very soon. All the gear is made on the premises and the boys given suitable instruction in the various aspects of the game, right from how to solder, upwards.

During September two notable events occurred, President Brian 5CA and Council member Bob 5PU both took unto themselves wives, one each of course, congratulations fellows, we all wish you both the best.

Rod 5SX recently heard to be making up a selectoject to cure some of the QRM, and incidentally, showed a good example when in QSO, responded to the first call for lunch; reckon he must have been real hungry. Austin 5WO now has 203 countries, including Clipperton; congrats. fellow, they must be getting hard to find by now. Warwick 5PS was recently called to a certain duty with a group of other similar "Trusted and True" types, when they had to be "confined" overnight. Pansie was made Matron of the Ward, and what a matron he made! Treasurer Clem now has his call sign allotted, guess what—5ZBB. No rude remarks please; another new call sign to VK5 is Cor 5WA who was 3AWT from Ouyen, welcome to the best State Cor. The Woomera boys 5WC buy log books by the dozen, they must be working 'em all right these days. Latest from there indicates the old shack demolished or vacated with no new site yet determined.

The R.D. Contest has again brought forth a little more activity, why not keep it up throughout the year? A number of calls crop up at R.D. and are not heard again for 12 months. F.E. are to be congratulated once again for the splendid organisation shown at the opening ceremony, which it is hoped will always be a part of the proceedings. This affords good publicity as well as keeping the main idea of the Contest before us all.

Jack 5AM had a bit of bother during the Contest with a series of mishaps, first he burnt out the power transformer in his rx, followed

by the same thing in his tx, finally after fixing these two items a short in the key click filter put him out of business. Wal 5DF still in bother with his modulator, so comes up on c.w., not many takers he finds, a good T9 note, Wal.

The W.I.C.E.N. boys still hard at practice and improving each time, they have been keen enough to go out and into the hills districts, on very wet and very cold nights, to test sites, frequencies, etc., and carry out exercises. Some talk of possibly trying out v.h.f., so you take it from there Neil.

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WESTERN AUSTRALIA

The August meeting of the Division was well attended, a feature of the meeting being the auction of the late Fred Tredrea's books. A visitor to the meeting was Herb 6XO, of Katanning. Herb had just received his license papers and call sign, and had a rig at home all ready to fire up. Since then, most of the low frequency boys have enjoyed QSOs with Herb. Also in Katanning and just about ready to go is 6XR. Best of luck there, boys.

In place of having a full-sized lecture by a guest speaker during meetings, we are trying an idea of having short lecturettes, dealing with topics, purely Ham. 6BE was the speaker at the August meeting, his subject being "Pi Tanks". September's speakers are 6RH (problems associated with using 6146s), and 6KW (building out modulators). Comments so far have been very favourable. If you would like a talk on any particular Ham topic, no matter how elementary it may be, let us know and we'll see what we can do.

Another OT in John 6GB has re-appeared on 40 and 80 mx. Jack has been exclusively v.h.f. for many years, but has now completed a Geloso controlled rig. Heard Jack renewing acquaintance with 6WL the other night. Only needed 6NL to complete the trio.

Bernie 6KJ has just finished a "mobile" holiday. Some of the boys worked him all the way round on his trip, Albany-Perth-Miling-Perth-Bunbury-Albany. Bernie's revamped No. 19 did a very nice job on the trip, apart from a little trouble which was located and cleared up during Bernie's stay with 6CL and XYL Roma.

The R.D. Contest has come and gone again, but this time VK6 is not quite so confident of success. Shrewd tactician 6RU tips a very close result. VK5 operators scored very heavily, while relatively poor conditions on 80 early on the Saturday night, plus the absence of two top scorers of last year (6TH and 6FD) told against VK6. Remarks have been made on the high standard of operating in the Contest this year, apart from the usual few pests who think they can get through on the modulator alone (known as "Winding up the Wick"). Unfortunately, the extra points gained by these chaps are lost by their fellows who can't copy through the QRM.

6TH has been absent on business in Sharks Bay, unfortunately missing the Contest. Since his return, Tom has put a pi tank in his final and I hear it is working out very well.

The Slow Morse Transmissions have resumed now that 6BE is back at work. If you're interested, listen on 3.6 Mc. at 8 p.m. on Wednesday night.

The 6 mx gang has been watching anxiously for signs of DX activity on that band, particularly since reports have been received that 4NG and company are into the DX again. Living in the tropics has some compensations apparently. Maybe they even like the climate! Good luck to you anyway, boys, even if we're a little envious.

This month's funny story: S.w.l. (now passed ticket) was visiting a VK6 shack. On one chair was the remains of a long defunct TA12D; on another was a cage, complete with a pink and grey galah. S.w.l. bends over to examine the remains; Cocky eyes the expanse of tightly stretched trouser and, ever an opportunist, gets right to the seat of the matter. S.w.l. straightens up with a howl of anguish, and turns to see what has attacked him. Cocky just looks at him with one eye and says nothing!

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TASMANIA

NORTH WESTERN ZONE

Well chaps, another R.D. Contest has come and gone with its usual crop of breakdowns; minor and otherwise. I heard most of the locals plugging away steadily. One, I won't mention names, reported that he went to sleep and forgot the Contest, so made a late start.

At our August meeting a new associate was welcomed in the person of David Waldon, another reinforcement for Ulverstone. How is the Morse going David?

On August 13 about nine associates gathered at the home of Jim 7JO, where we were solidly thrashed on the subjects the examiners revel in. Our worthy Secretary looked longingly at Jim's rig and dreamed of the time when he can go to it with his own gear. Jim's XYL turned on a lovely supper as a final to Ohm's Law, etc. Once again our thanks to you and your XYL, Jim, I am very very sure the boys benefitted greatly. On Aug. 21 Max Ives, John Lee and myself got together on some morse. Practice must be kept up at all costs.

At the moment of writing yours truly is in VK3-land returning from Sydney where I visited some of the better known disposal stores. Boy! did I walk some miles; those stores are scattered and Sydney is a big place. I am afraid their goods are easier to locate by reading advertisements; mainly huge piles of equipment. Melbourne stores proved much the same, but with higher prices. Broadcast reception here on the mainland is not as good as at home, the Interstate stations not proving very useful; so I suppose we have something to be thankful for in our location.

I trust all the hopeful associates got their applications away in time, anyway best of luck chaps, I hope we all pass OK, then there'll be some difficulty finding a clear spot on the bands for a while.

Several committee members met the Burnie Fire Brigade in August to discuss two-way radio equipment for Brigade vehicles; I guess we will hear all about it at the next meeting.

Had a yarn to Max 3ZS whilst in Melbourne, also Dave 2AYE; main topic being the I.T.U. Conference. They both stressed the importance of sending a representative, so don't forget your contributions, please.

Saw another t.v. set like yours Syd, covered just as great an area, too.

Many Happy Returns to "A.R."

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PAPUA-NEW GUINEA

We are back on deck this month after the mad rush getting ready for the R.D. Contest; the XYL is very pleased, she can walk into the lounge again without falling over odd bits of rig. By the time this goes to press Bob 9BS will be back from the bush and possibly back in the home town—Rabaul. Roy 9AU has left Wewak and is now stationed in Port Moresby. We hope to see you take an active part in the doings of the Division Roy, and when you get settled in, hope to hear you in the Sunday hook-up at 8.30 a.m. Bob Murphy will be travelling round in the future and will be in Lae for about three months and also in Madang for the same period. Bob has bought an SX99 and reckons its the goods. Another Bob, 9AA, is on leave at present and will be bringing back a new SX100. This will go well with that neat Viking Ranger Bob and by the way, it's time that conical quad was taken out of the lounge! J. Whittaker, 9AS, has been very quiet of late and you know why. He has set up a radar unit on the roof and a television rx in the lounge and just sits staring, sure he has heard t.v. programmes from the Philippines but as yet there has been no pretties to look at. I think you better give it away and come back on the air; it won't be such a strain on the eyes.

Eddie 9AT is back from leave and has been transferred to Garoka. Hope to hear your mellow voice again on Sundays, Ed.; by the way, how is your t.v. going? Doug 9DB has learned to play golf at last and once again can be heard on the bands occasionally. Another strange voice lately has been Doug 9SB, who has been off the air for about 12 months, and has just built a table-top rig using a Geloso and reckons he'll have a tri-band quad in operation for the VK-ZL Contest. Reg 9SP is down south, having a spot of leave at present. Also down that way is Bill 9WP. Our Secretary, Peter 9PO, is back on his feet again after his recent illness and we trust you don't have any more bad luck. Another old member, Charlie 9WG, has also been in hospital recently with a bad leg complaint, and the birdie tells me he is going south shortly to recuperate. We wish you all the best, Charlie, and hope it won't be long until you are your old self again.

Well chaps, that's it for this month, and remember the meeting night is the last Wednesday of the month and the Sunday broadcast and hook-up is on every Sunday at 8.30 a.m. on both 7 and 14 Mc. We'll be looking round for you.

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Advertisements under this heading will only be accepted from Institute Members who desire to dispose of equipment which is their own personal property. Copy must be received by 8th of the month, and remittance must accompany advertisement. Calculation of cost is based on an average of six words a line. Dealers' advertisements not accepted in this column.

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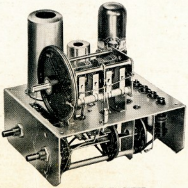

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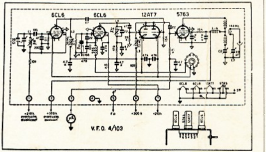

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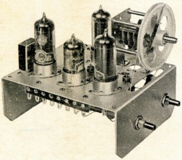

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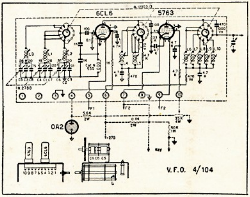
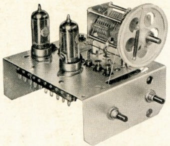
R.F. Power Output: Sufficient to drive an 832 or 2E26.

Valve Line-Up: Two 6CL6 oscillator multipliers, one 12AT7 multiplier, one 5763 driver.

The unit incorporates two different oscillator multipliers, one variable for establishing communication, one crystal-controlled fixed frequency oscillator for working.



CIRCUIT DIAGRAM FOR 4/104



4/104 V.F.O. 6-BAND UNIT EXCITER

MODEL 4/104 V.F.O. UNIT EXCITER

Six Bands: 80, 40, 20, 15, 11, and 10 metres.

R.F. Power Output: Sufficient to drive one 807 or 6146 for phone or c.w.

Valve Line-Up: 6CL6 oscillator, 5763 driver.

This is an oscillator exciter of high stability, because of its conveniently selected C/L ratio and the 6CL6 oscillator tube employed.

SEE YOUR REGULAR WHOLESALER **NOW!**

Sole Australian Factory Representatives: **R. H. CUNNINGHAM PTY. LTD.**

8 BROMHAM PLACE, RICHMOND, E.1, VIC. Phone: JB 1614. Cable: "Cunnig" Melbourne.
16 ANGAS ST., MEADOWBANK, N.S.W. Phones: WY 0316, WY 3852. Cable: "Cunnig" Sydney.